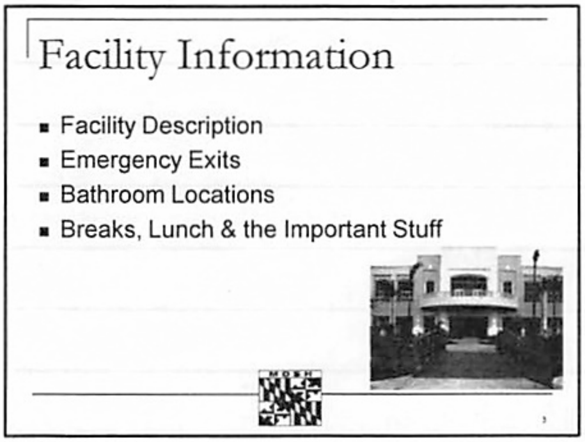
General Industry Safety II

Presented by: Tom Thorsen

Compliance Specialist
MOSH

Biography

- Tom Thorsen
- Maryland Occupational Safety and Health
- 17 Years
- Regional Supervisor
- thorsen.tom@dol.gov
- 410-527-4429



Facility Information

- Facility Description
- Emergency Exits
- Bathroom Locations
- Breaks, Lunch & the Important Stuff

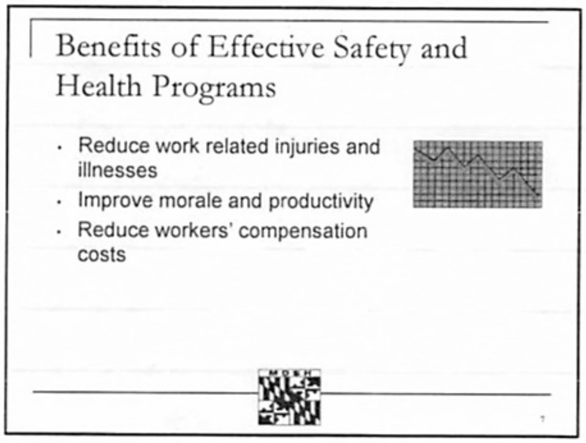
Introductions

- Name
- Company Name
- Job Title
- What you would like to get from the class

Program Objectives Overview

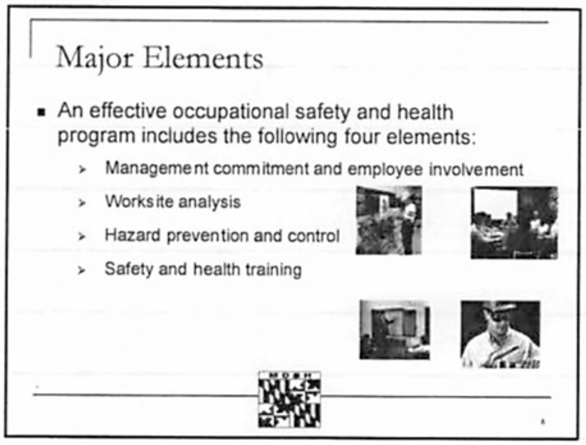
- Clearly state an overview of commonly found elements in General Industry
- Establish and communicate a clear goal and objective to learning fundamentals of General Industry standards and practices
- Involve individuals throughout the course to get an understanding of general industry topics

Safety and Health Programs



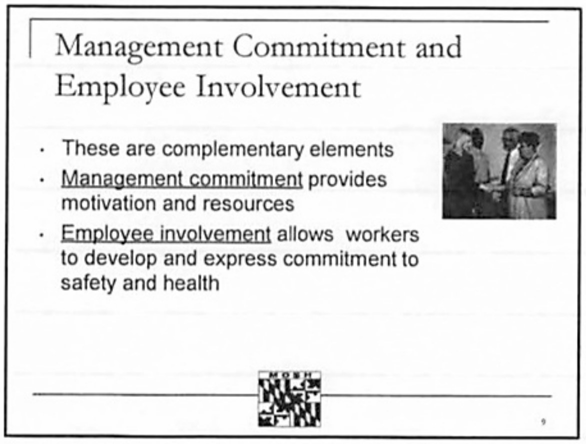
Benefits of Effective Safety and Health Programs

- Reduce work related injuries and illnesses
- Improve morale and productivity
- Reduce workers' compensation costs



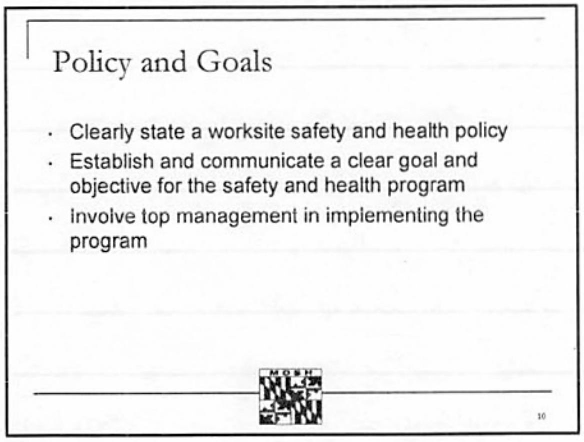
Major Elements

- An effective occupational safety and health program includes the following four elements:
  - Management commitment and employee involvement
  - Worksite analysis
  - Hazard prevention and control
  - Safety and health training



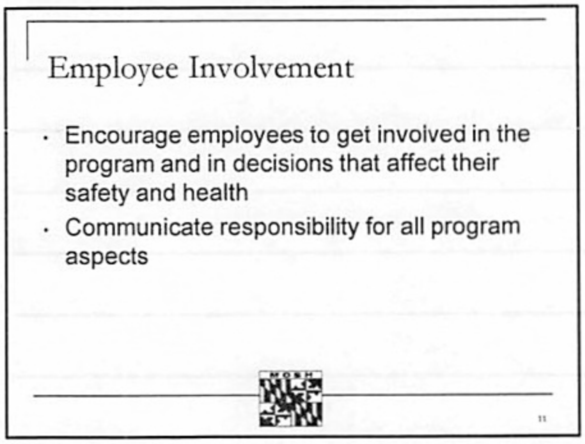
Management Commitment and Employee Involvement

- These are complementary elements
- Management commitment provides motivation and resources
- Employee involvement allows workers to develop and express commitment to safety and health



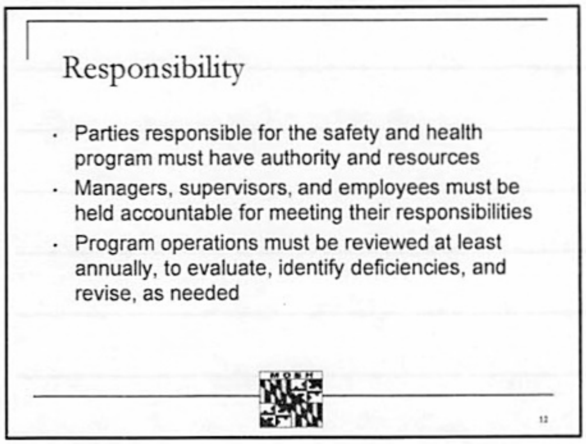
Policy and Goals

- Clearly state a worksite safety and health policy
- Establish and communicate a clear goal and objective for the safety and health program
- Involve top management in implementing the program



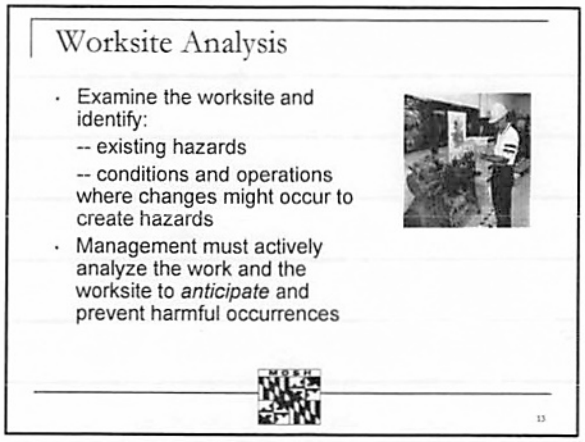
Employee Involvement

- Encourage employees to get involved in the program and in decisions that affect their safety and health
- Communicate responsibility for all program aspects



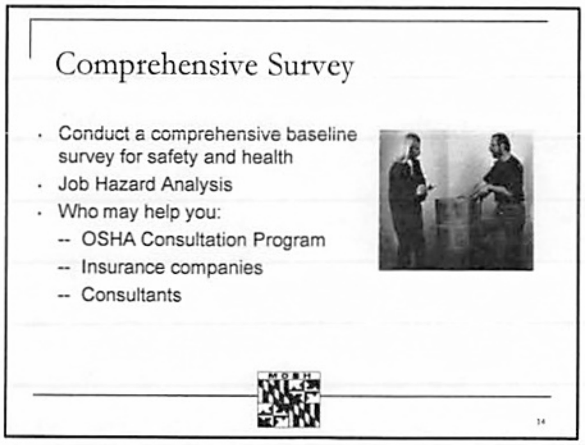
Responsibility

- Parties responsible for the safety and health program must have authority and resources
- Managers, supervisors, and employees must be held accountable for meeting their responsibilities
- Program operations must be reviewed at least annually, to evaluate, identify deficiencies, and revise, as needed



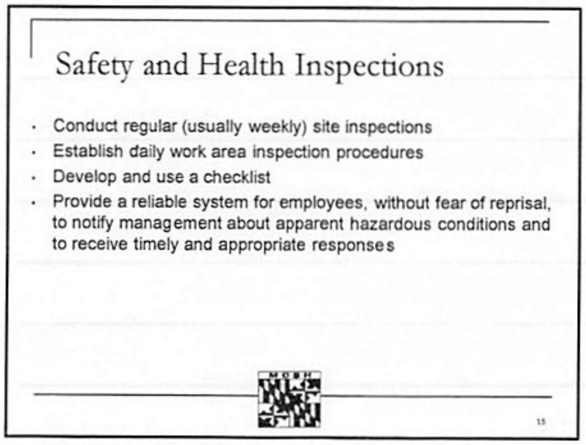
Worksite Analysis

- Examine the worksite and identify:
  - -- existing hazards
  - -- conditions and operations where changes might occur to create hazards
- Management must actively analyze the work and the worksite to *anticipate* and prevent harmful occurrences



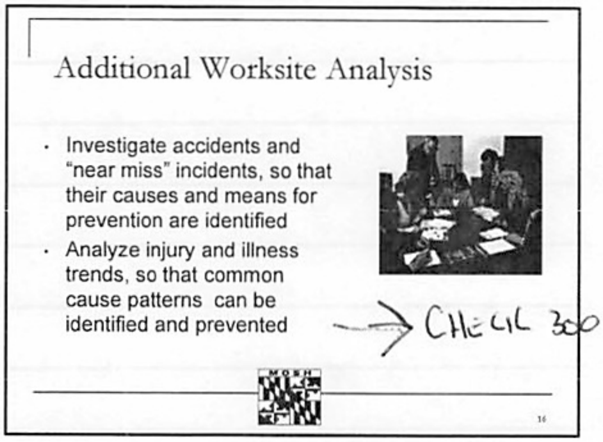
Comprehensive Survey

- Conduct a comprehensive baseline survey for safety and health
- Job Hazard Analysis
- Who may help you:
  - -- OSHA Consultation Program
  - -- Insurance companies
  - -- Consultants



Safety and Health Inspections

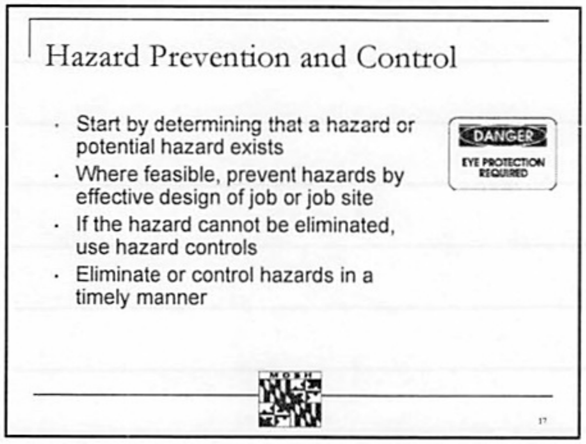
- Conduct regular (usually weekly) site inspections
- Establish daily work area inspection procedures
- Develop and use a checklist
- Provide a reliable system for employees, without fear of reprisal, to notify management about apparent hazardous conditions and to receive timely and appropriate responses



Additional Worksite Analysis

- Investigate accidents and "near miss" incidents, so that their causes and means for prevention are identified
- Analyze injury and illness trends, so that common cause patterns can be identified and prevented

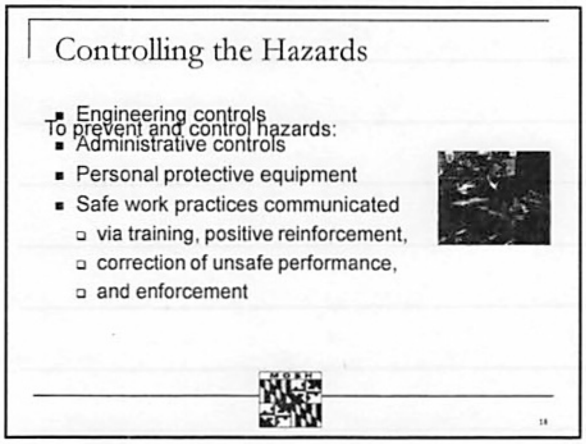
→ CHECK 300 LOG.



Hazard Prevention and Control

DANGER
EYE PROTECTION REQUIRED

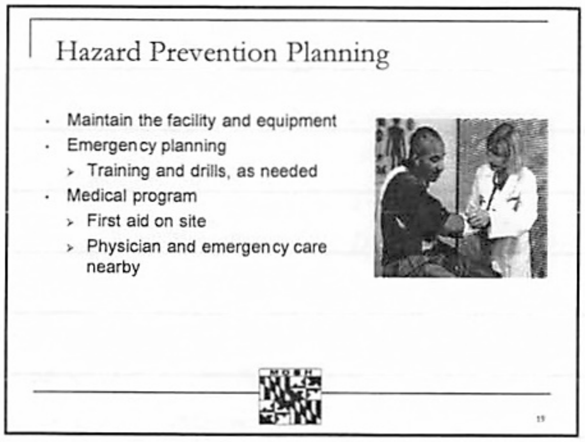
- Start by determining that a hazard or potential hazard exists
- Where feasible, prevent hazards by effective design of job or job site
- If the hazard cannot be eliminated, use hazard controls
- Eliminate or control hazards in a timely manner



Controlling the Hazards

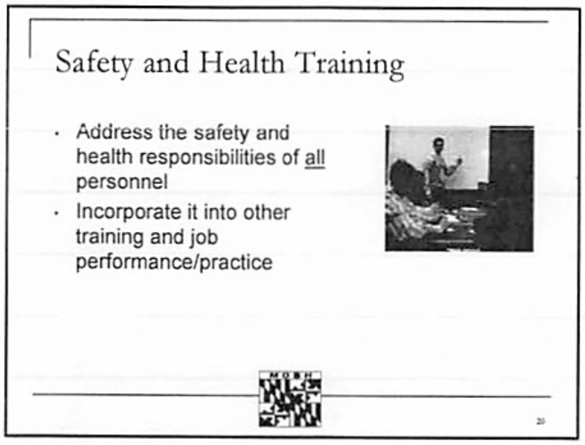
To prevent and control hazards:

- Engineering controls
- Administrative controls
- Personal protective equipment
- Safe work practices communicated
  - via training, positive reinforcement,
  - correction of unsafe performance,
  - and enforcement



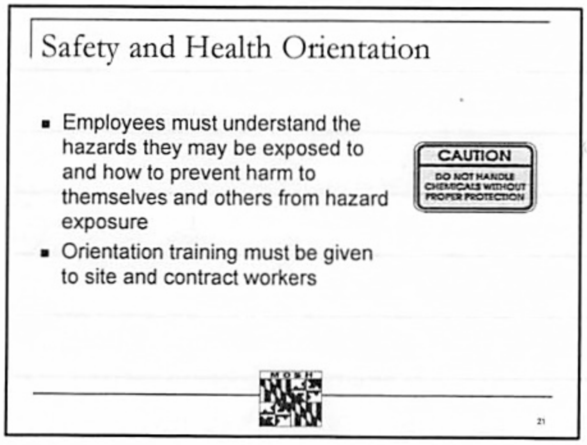
Hazard Prevention Planning

- Maintain the facility and equipment
- Emergency planning
  - Training and drills, as needed
- Medical program
  - First aid on site
  - Physician and emergency care nearby



Safety and Health Training

- Address the safety and health responsibilities of all personnel
- Incorporate it into other training and job performance/practice



Safety and Health Orientation

- Employees must understand the hazards they may be exposed to and how to prevent harm to themselves and others from hazard exposure
- Orientation training must be given to site and contract workers

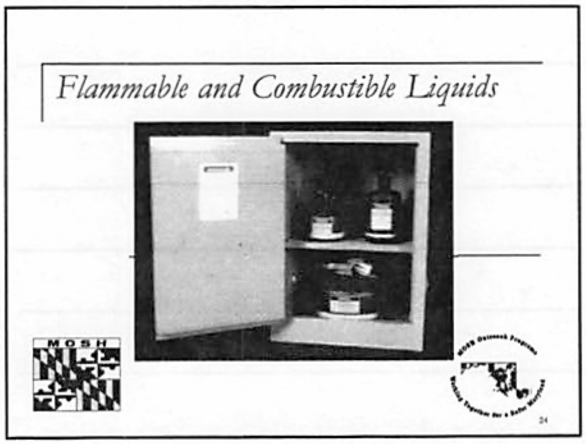
CAUTION
DO NOT HANDLE CHEMICALS WITHOUT PROPER PROTECTION

Supervisor Responsibilities

- Analyze work to identify potential hazards in area of responsibility
- Maintain physical protections in work areas
- Reinforce employee training through performance feedback and, if needed, enforcement of safe work practices

Summary

- Reduce work related injuries and illnesses
- Improve morale and productivity
- Reduce workers' compensation costs
- Include these four elements:
  - Management commitment and employee involvement
  - Worksite analysis
  - Hazard prevention and control
  - Safety and health training



Flammable and Combustible Liquids

Introduction

- The two primary hazards associated with flammable and combustible liquids are *explosion* and *fire*
- Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards

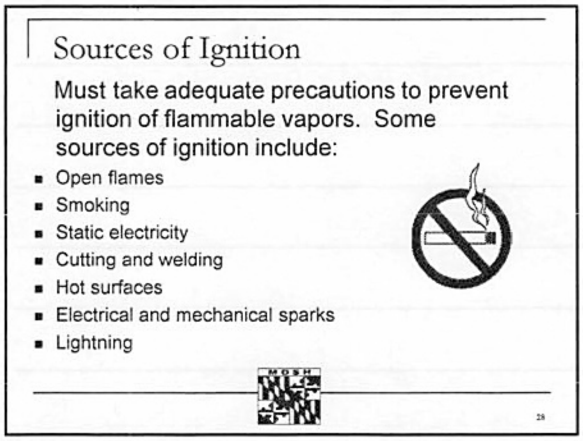
Flash Point

- Flash point means the minimum temperature at which a liquid gives off enough vapor to form an ignitable mixture
- In general, the lower the flash point, the greater the hazard
- Flammable liquids have flash points below 100°F, and are more dangerous than combustible liquids, since they may be ignited at room temperature
- Combustible liquids have flash points at or above 100°F
- Although combustible liquids have higher flash points than flammable liquids, they can pose serious fire and/or explosion hazards when heated

Program Components

A good plan for safe use of flammable and combustible liquids contains at least these components:

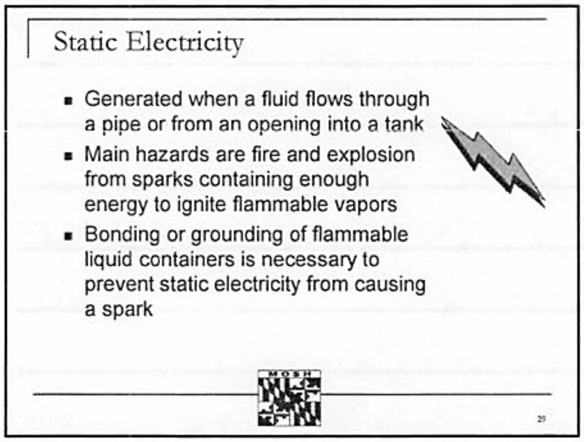
- Control of ignition sources
- Proper storage
- Fire control
- Safe handling



Sources of Ignition

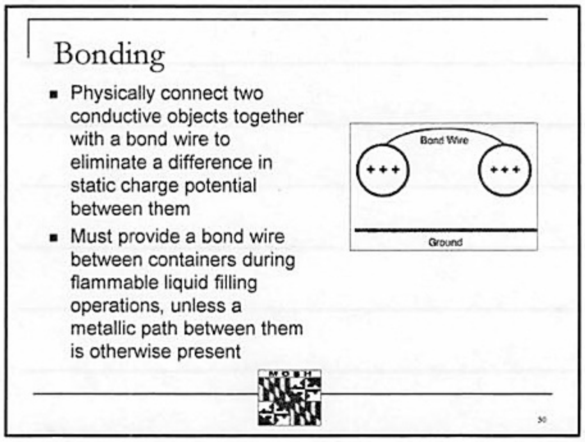
Must take adequate precautions to prevent ignition of flammable vapors. Some sources of ignition include:

- Open flames
- Smoking
- Static electricity
- Cutting and welding
- Hot surfaces
- Electrical and mechanical sparks
- Lightning



Static Electricity

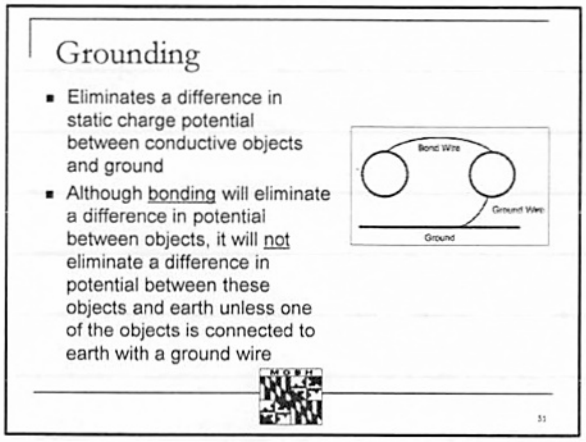
- Generated when a fluid flows through a pipe or from an opening into a tank
- Main hazards are fire and explosion from sparks containing enough energy to ignite flammable vapors
- Bonding or grounding of flammable liquid containers is necessary to prevent static electricity from causing a spark



Bonding

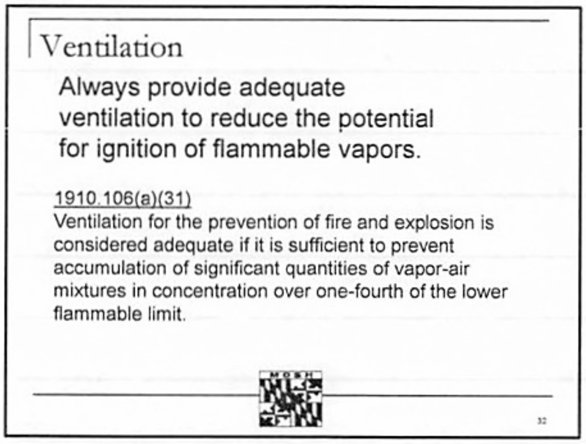
- Physically connect two conductive objects together with a bond wire to eliminate a difference in static charge potential between them
- Must provide a bond wire between containers during flammable liquid filling operations, unless a metallic path between them is otherwise present

Bond Wire
+++
+++
Ground



Grounding

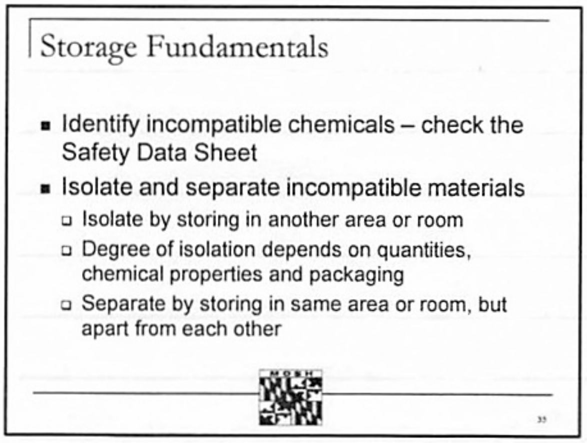
- Eliminates a difference in static charge potential between conductive objects and ground
- Although bonding will eliminate a difference in potential between objects, it will not eliminate a difference in potential between these objects and earth unless one of the objects is connected to earth with a ground wire



Ventilation

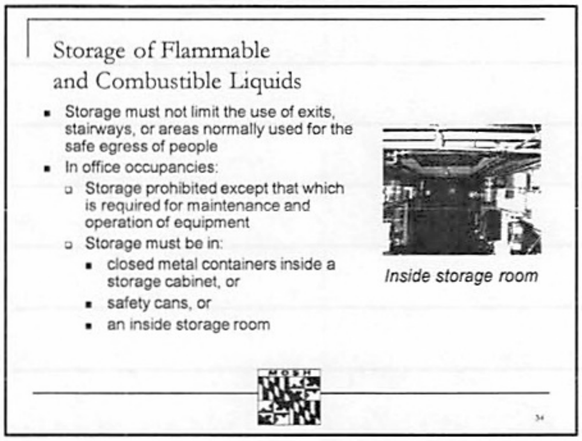
Always provide adequate ventilation to reduce the potential for ignition of flammable vapors.

1910.106(a)(31)
Ventilation for the prevention of fire and explosion is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.



Storage Fundamentals

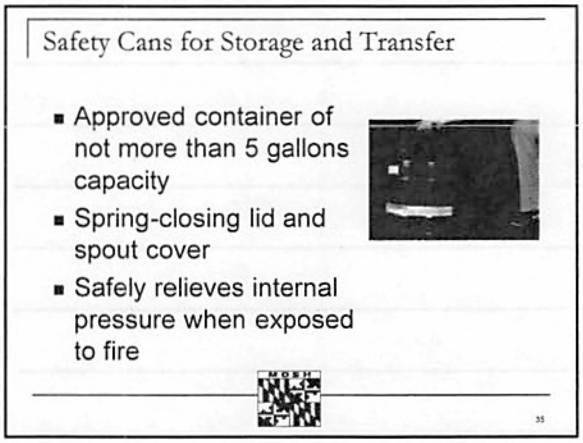
- Identify incompatible chemicals – check the Safety Data Sheet
- Isolate and separate incompatible materials
  - Isolate by storing in another area or room
  - Degree of isolation depends on quantities, chemical properties and packaging
  - Separate by storing in same area or room, but apart from each other



Storage of Flammable and Combustible Liquids

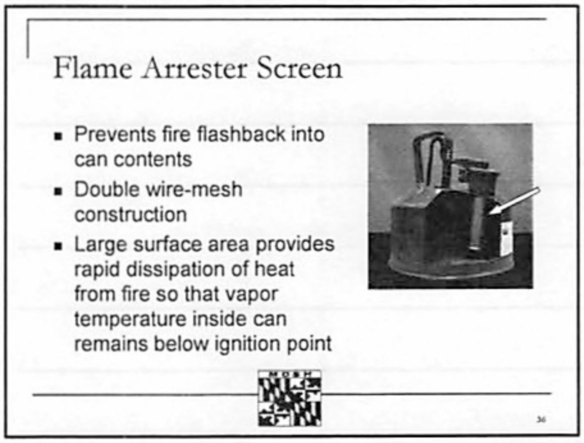
- Storage must not limit the use of exits, stairways, or areas normally used for the safe egress of people
- In office occupancies:
  - Storage prohibited except that which is required for maintenance and operation of equipment
  - Storage must be in:
    - closed metal containers inside a storage cabinet, or
    - safety cans, or
    - an inside storage room

Inside storage room



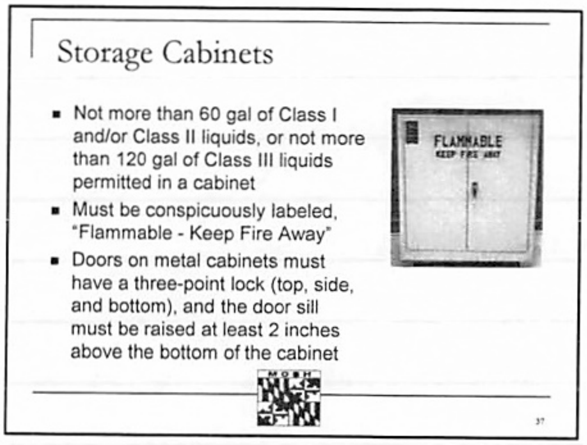
Safety Cans for Storage and Transfer

- Approved container of not more than 5 gallons capacity
- Spring-closing lid and spout cover
- Safely relieves internal pressure when exposed to fire



Flame Arrester Screen

- Prevents fire flashback into can contents
- Double wire-mesh construction
- Large surface area provides rapid dissipation of heat from fire so that vapor temperature inside can remains below ignition point



Storage Cabinets

- Not more than 60 gal of Class I and/or Class II liquids, or not more than 120 gal of Class III liquids permitted in a cabinet
- Must be conspicuously labeled, "Flammable - Keep Fire Away"
- Doors on metal cabinets must have a three-point lock (top, side, and bottom), and the door sill must be raised at least 2 inches above the bottom of the cabinet

FLAMMABLE
KEEP FIRE AWAY
MOSH

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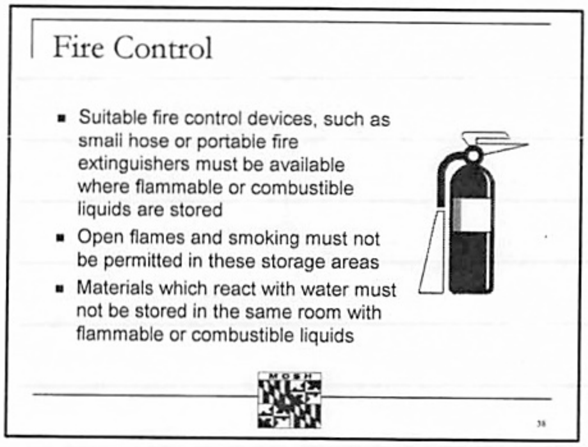

Fire Control

- Suitable fire control devices, such as small hose or portable fire extinguishers must be available where flammable or combustible liquids are stored
- Open flames and smoking must not be permitted in these storage areas
- Materials which react with water must not be stored in the same room with flammable or combustible liquids

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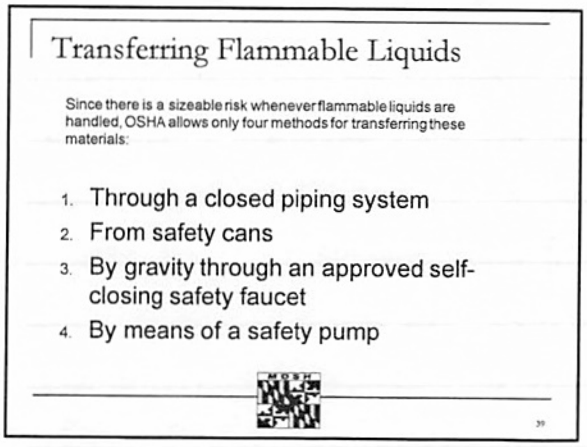

Transferring Flammable Liquids

Since there is a sizeable risk whenever flammable liquids are handled, OSHA allows only four methods for transferring these materials:

1. Through a closed piping system
2. From safety cans
3. By gravity through an approved self-closing safety faucet
4. By means of a safety pump

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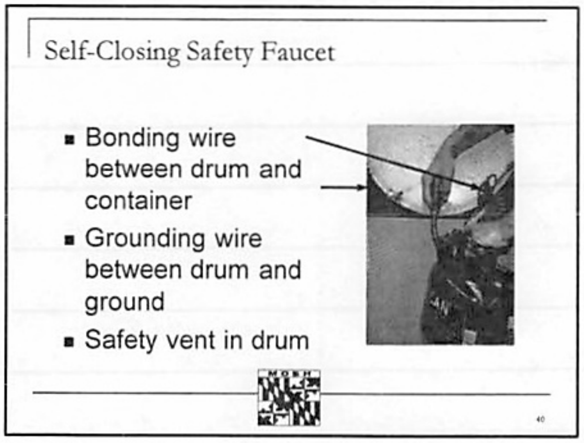
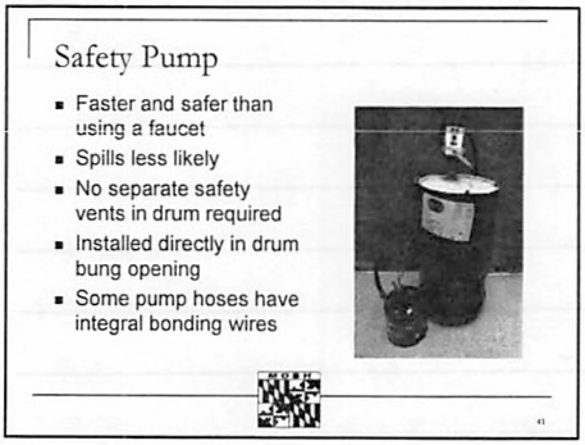


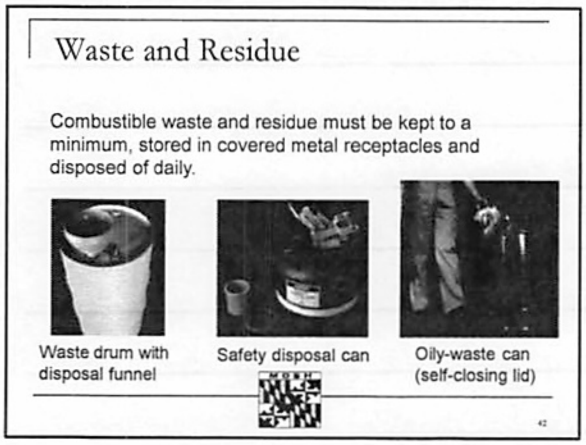
Self-Closing Safety Faucet

- Bonding wire between drum and container
- Grounding wire between drum and ground
- Safety vent in drum



Safety Pump

- Faster and safer than using a faucet
- Spills less likely
- No separate safety vents in drum required
- Installed directly in drum bung opening
- Some pump hoses have integral bonding wires



Waste and Residue

Combustible waste and residue must be kept to a minimum, stored in covered metal receptacles and disposed of daily.

Waste drum with disposal funnel

Safety disposal can

Oily-waste can (self-closing lid)

Safe Handling Fundamentals

- Carefully read the manufacturer's label on the flammable liquid container before storing or using it
- Practice good housekeeping in flammable liquid storage areas
- Clean up spills immediately, then place the cleanup rags in a covered metal container
- Only use approved metal safety containers or original manufacturer's container to store flammable liquids
- Keep the containers closed when not in use and store away from exits or passageways
- Use flammable liquids only where there is plenty of ventilation
- Keep flammable liquids away from ignition sources such as open flames, sparks, smoking, cutting, welding, etc.

Summary

- The two primary hazards associated with flammable and combustible liquids are explosion and fire
- Safe handling and storage of flammable liquids requires the use of approved equipment and practices per OSHA standards
- An excellent reference on this topic is National Fire Protection Association Standard No. 30, *Flammable and Combustible Liquids Code*

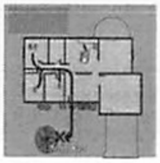
Exit Routes, Emergency Action Plans, Fire Prevention Plans, and Fire Protection

Introduction

- Fires and explosions kill more than 200 and injure more than 5,000 workers each year
- There is a long and tragic history of workplace fires in this country caused by problems with fire exits and extinguishing systems
- OSHA requires employers to provide proper exits, fire fighting equipment, and employee training to prevent fire deaths and injuries in the workplace

Exit Route

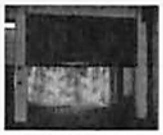
- A continuous and unobstructed path of exit travel from any point within a workplace to a place of safety (including refuge areas)
- Consists of three parts:
  - ☐ Exit access
  - ☐ Exit
  - ☐ Exit discharge



Exit Routes

Basic Requirements

- Exit routes must be permanent and there must be enough exits in the proper arrangement for quick escape
- Exits must be separated by fire-resistant materials
- Openings into an exit must be limited to those necessary to allow access to the exit or to the exit discharge
- An opening into an exit must be protected by an approved self-closing fire door that remains closed or automatically closes in an emergency



Exit Discharge

- Each exit discharge must lead directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside that is large enough to accommodate all building occupants likely to use the exit route
- Exit stairs that continue beyond the level on which the exit discharge is located must be interrupted on that level by doors, partitions, or other effective means that clearly indicate the direction of travel to the exit discharge

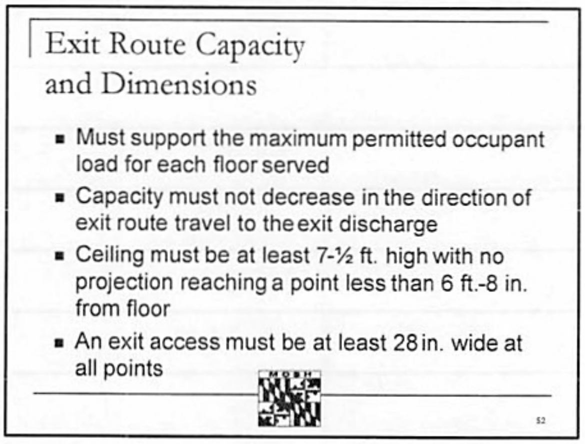
Exit Doors Must Be Unlocked

- Must be able to open from the inside at all times without keys, tools, or special knowledge
- Device such as a panic bar that locks only from the outside is permitted
- Must be free of any device or alarm that could restrict emergency use if the device or alarm fails
- May be locked from the inside only in mental, penal, or correctional facilities where there is constant supervision

Locked and blocked exit

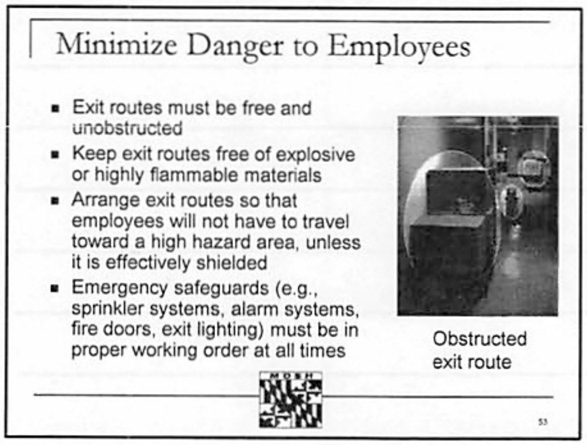
Side-Hinged Exit Door

- Must be used to connect any room to an exit route
- A door that connects any room to an exit route must swing out in the direction of exit travel if the room is designed to be occupied by more than 50 people or contains high hazard contents



Exit Route Capacity and Dimensions

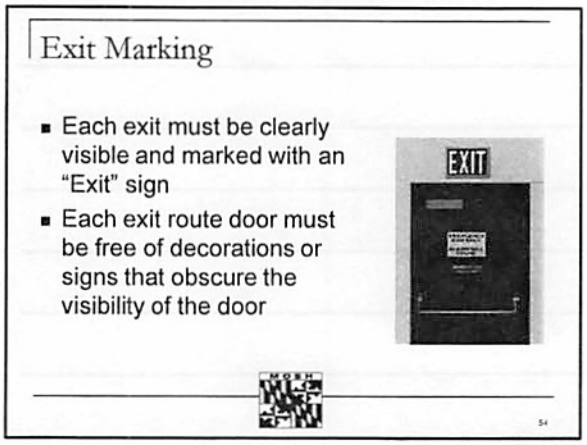
- Must support the maximum permitted occupant load for each floor served
- Capacity must not decrease in the direction of exit route travel to the exit discharge
- Ceiling must be at least 7-½ ft. high with no projection reaching a point less than 6 ft.-8 in. from floor
- An exit access must be at least 28 in. wide at all points



Minimize Danger to Employees

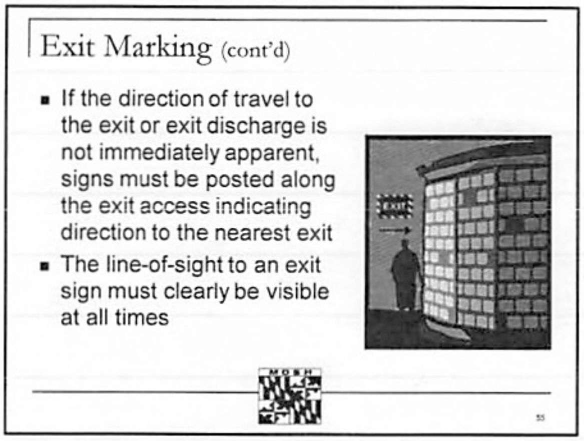
- Exit routes must be free and unobstructed
- Keep exit routes free of explosive or highly flammable materials
- Arrange exit routes so that employees will not have to travel toward a high hazard area, unless it is effectively shielded
- Emergency safeguards (e.g., sprinkler systems, alarm systems, fire doors, exit lighting) must be in proper working order at all times

Obstructed exit route



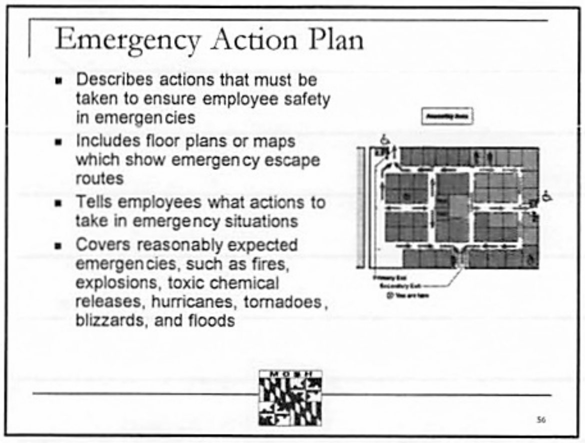
Exit Marking

- Each exit must be clearly visible and marked with an "Exit" sign
- Each exit route door must be free of decorations or signs that obscure the visibility of the door



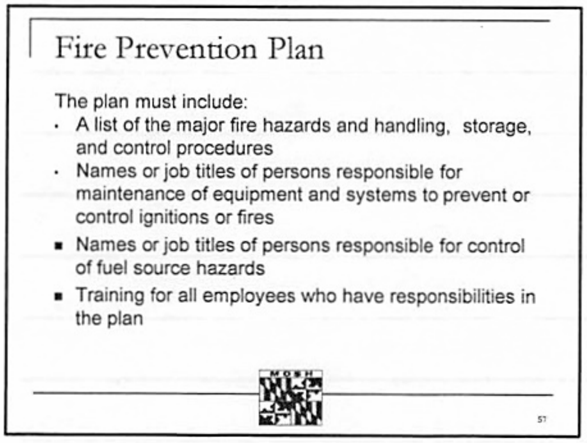
Exit Marking (cont'd)

- If the direction of travel to the exit or exit discharge is not immediately apparent, signs must be posted along the exit access indicating direction to the nearest exit
- The line-of-sight to an exit sign must clearly be visible at all times



Emergency Action Plan

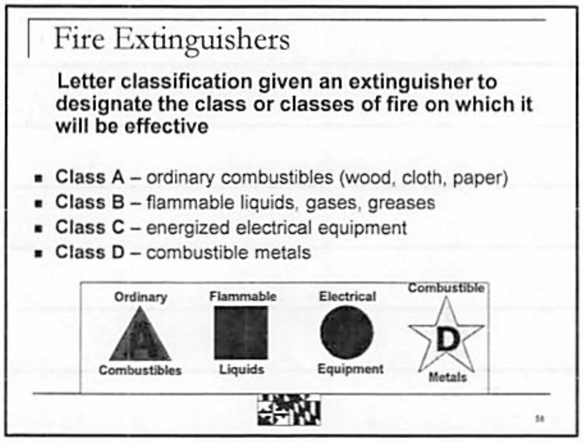
- Describes actions that must be taken to ensure employee safety in emergencies
- Includes floor plans or maps which show emergency escape routes
- Tells employees what actions to take in emergency situations
- Covers reasonably expected emergencies, such as fires, explosions, toxic chemical releases, hurricanes, tornadoes, blizzards, and floods



Fire Prevention Plan

The plan must include:

- A list of the major fire hazards and handling, storage, and control procedures
- Names or job titles of persons responsible for maintenance of equipment and systems to prevent or control ignitions or fires
- Names or job titles of persons responsible for control of fuel source hazards
- Training for all employees who have responsibilities in the plan

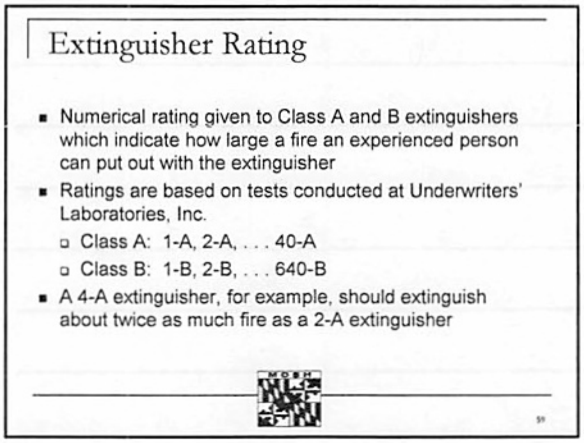


Fire Extinguishers

Letter classification given an extinguisher to designate the class or classes of fire on which it will be effective

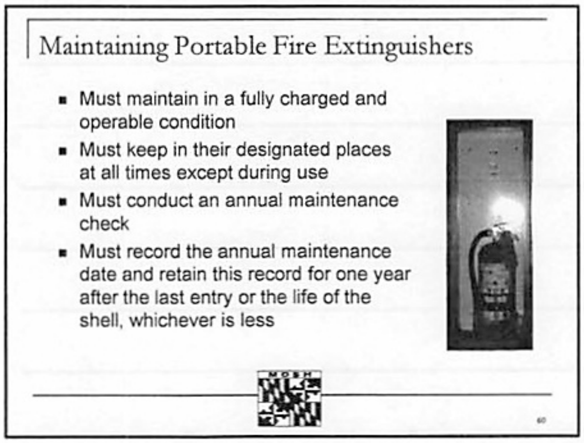
- **Class A** – ordinary combustibles (wood, cloth, paper)
- **Class B** – flammable liquids, gases, greases
- **Class C** – energized electrical equipment
- **Class D** – combustible metals

Ordinary
Combustibles
Flammable
Liquids
Electrical
Equipment
Combustible
D
Metals



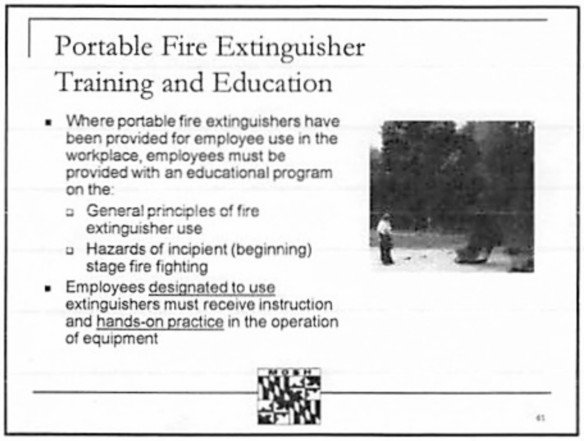
Extinguisher Rating

- Numerical rating given to Class A and B extinguishers which indicate how large a fire an experienced person can put out with the extinguisher
- Ratings are based on tests conducted at Underwriters' Laboratories, Inc.
  - Class A: 1-A, 2-A, . . . 40-A
  - Class B: 1-B, 2-B, . . . 640-B
- A 4-A extinguisher, for example, should extinguish about twice as much fire as a 2-A extinguisher



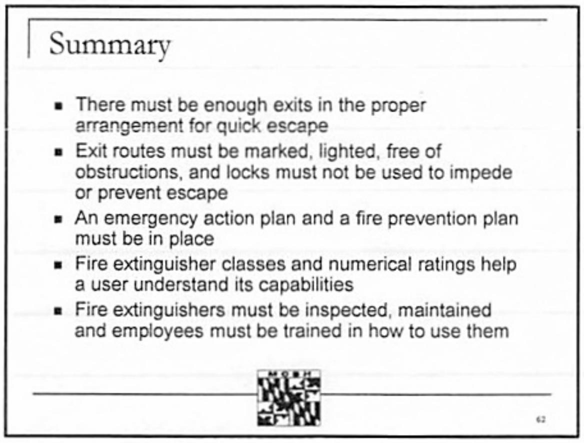
Maintaining Portable Fire Extinguishers

- Must maintain in a fully charged and operable condition
- Must keep in their designated places at all times except during use
- Must conduct an annual maintenance check
- Must record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less



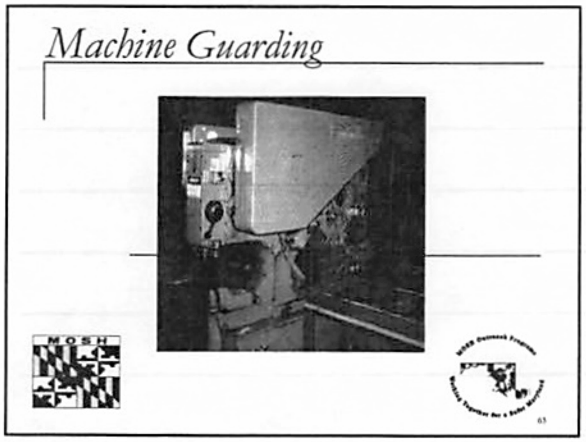
Portable Fire Extinguisher Training and Education

- Where portable fire extinguishers have been provided for employee use in the workplace, employees must be provided with an educational program on the:
  - General principles of fire extinguisher use
  - Hazards of incipient (beginning) stage fire fighting
- Employees designated to use extinguishers must receive instruction and hands-on practice in the operation of equipment

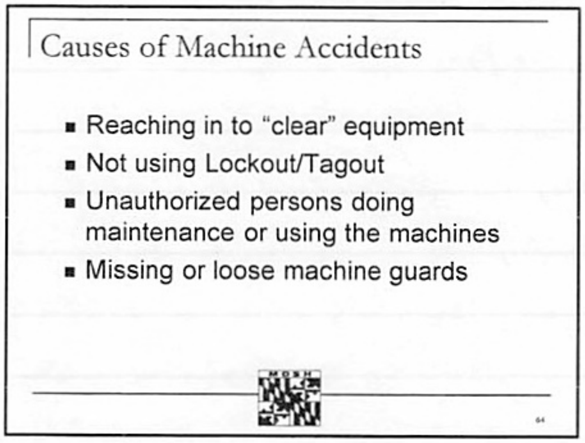


Summary

- There must be enough exits in the proper arrangement for quick escape
- Exit routes must be marked, lighted, free of obstructions, and locks must not be used to impede or prevent escape
- An emergency action plan and a fire prevention plan must be in place
- Fire extinguisher classes and numerical ratings help a user understand its capabilities
- Fire extinguishers must be inspected, maintained and employees must be trained in how to use them

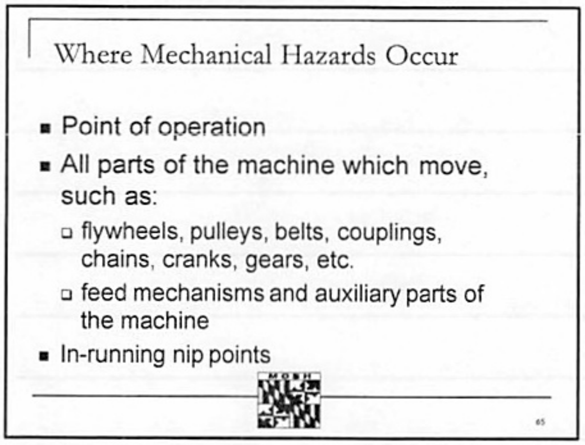


Machine Guarding



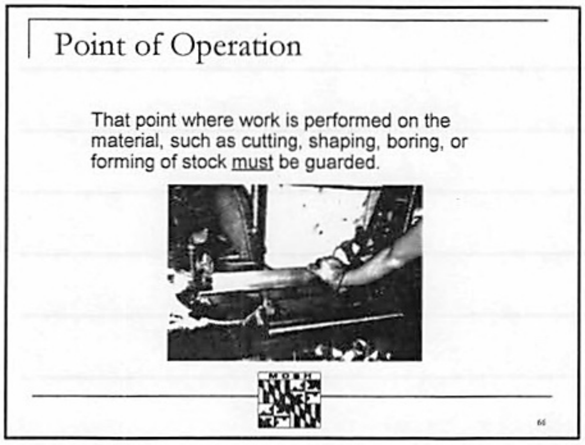
Causes of Machine Accidents

- Reaching in to “clear” equipment
- Not using Lockout/Tagout
- Unauthorized persons doing maintenance or using the machines
- Missing or loose machine guards



Where Mechanical Hazards Occur

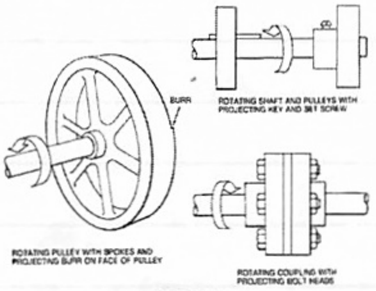
- Point of operation
- All parts of the machine which move, such as:
  - flywheels, pulleys, belts, couplings, chains, cranks, gears, etc.
  - feed mechanisms and auxiliary parts of the machine
- In-running nip points



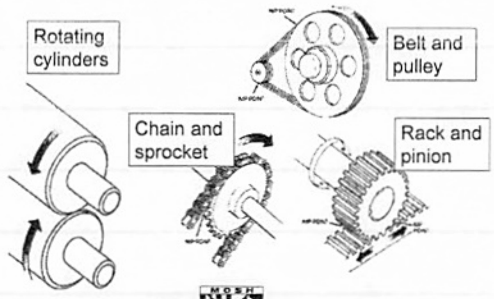
Point of Operation

That point where work is performed on the material, such as cutting, shaping, boring, or forming of stock must be guarded.

Rotating Parts

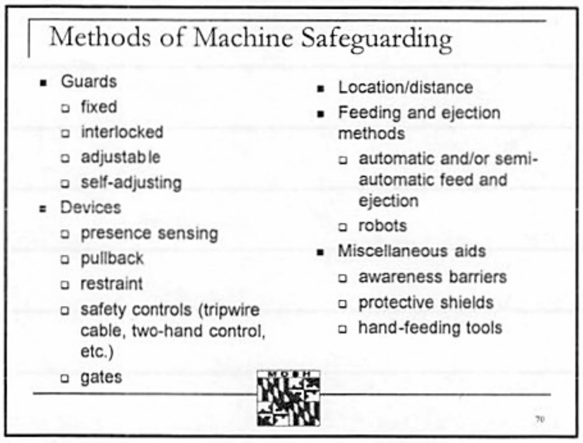

BURR
ROTATING SHAFT AND PULLEYS WITH PROJECTING KEY AND SET SCREW
ROTATING PULLEY WITH SPOKES AND PROJECTING BURR ON FACE OF PULLEY
ROTATING COUPLING WITH PROJECTING BOLT HEADS

In-Running Nip Points


Rotating cylinders
Belt and pulley
Chain and sprocket
Rack and pinion

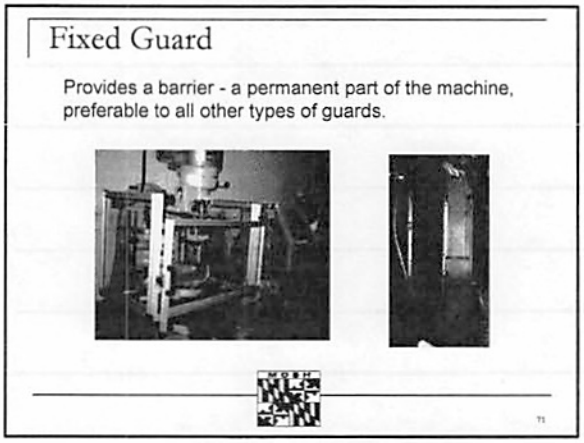
Requirements for Safeguards

- Prevent contact - prevent worker's body or clothing from contacting hazardous moving parts
- Secure - firmly secured to machine and not easily removed
- Protect from falling objects - ensure that no objects can fall into moving parts
- Create no new hazards - must not have shear points, jagged edges or unfinished surfaces
- Create no interference - must not prevent worker from performing the job quickly and comfortably
- Allow safe lubrication - if possible, be able to lubricate the machine without removing the safeguards



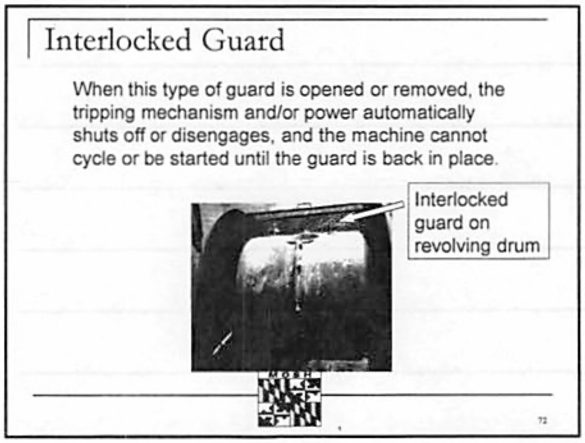
Methods of Machine Safeguarding

- Guards
  - fixed
  - interlocked
  - adjustable
  - self-adjusting
- Devices
  - presence sensing
  - pullback
  - restraint
  - safety controls (tripwire cable, two-hand control, etc.)
  - gates
- Location/distance
- Feeding and ejection methods
  - automatic and/or semi-automatic feed and ejection
  - robots
- Miscellaneous aids
  - awareness barriers
  - protective shields
  - hand-feeding tools



Fixed Guard

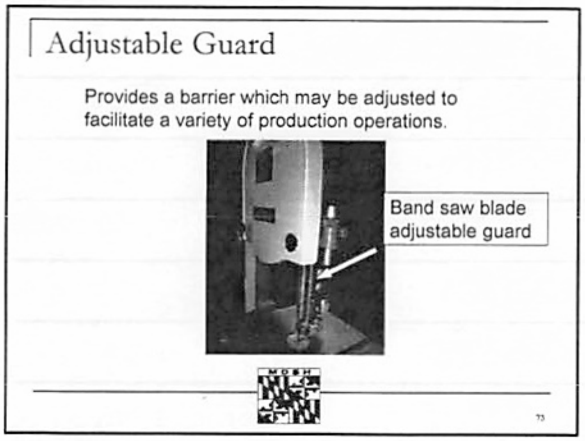
Provides a barrier - a permanent part of the machine, preferable to all other types of guards.



Interlocked Guard

When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages, and the machine cannot cycle or be started until the guard is back in place.

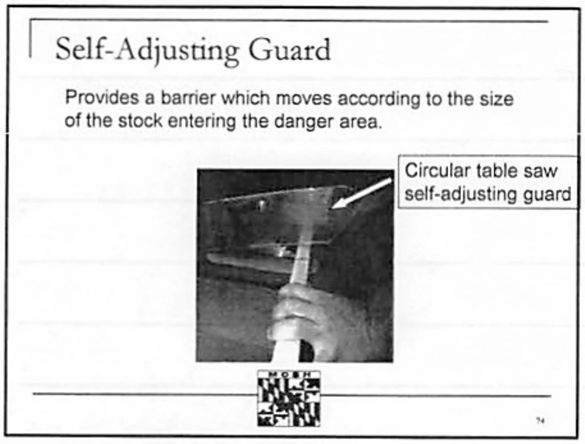
Interlocked guard on revolving drum



Adjustable Guard

Provides a barrier which may be adjusted to facilitate a variety of production operations.

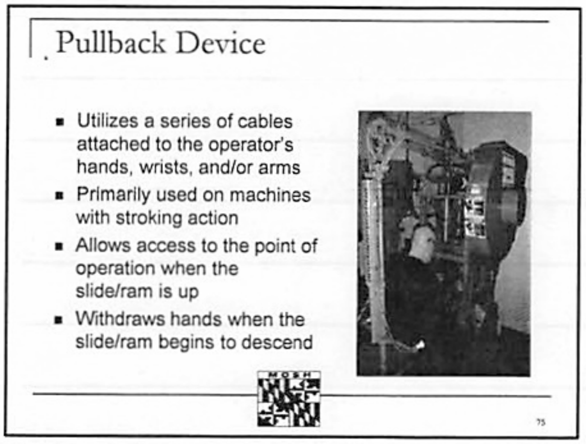
Band saw blade adjustable guard



Self-Adjusting Guard

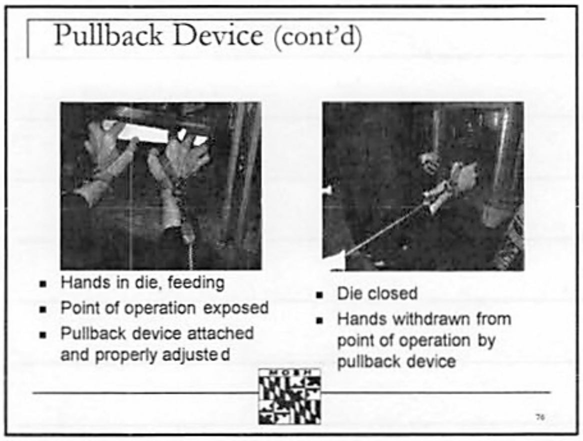
Provides a barrier which moves according to the size of the stock entering the danger area.

Circular table saw self-adjusting guard



Pullback Device

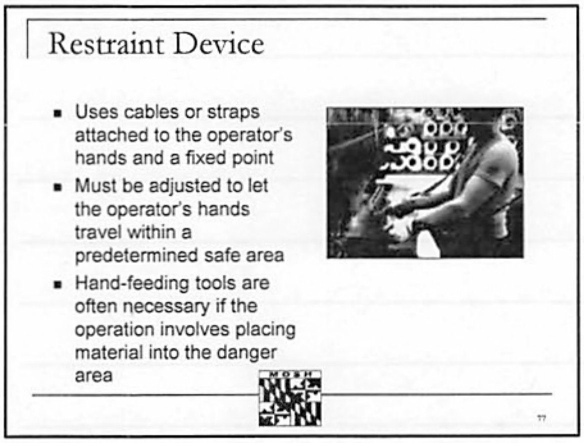
- Utilizes a series of cables attached to the operator's hands, wrists, and/or arms
- Primarily used on machines with stroking action
- Allows access to the point of operation when the slide/ram is up
- Withdraws hands when the slide/ram begins to descend



Pullback Device (cont'd)

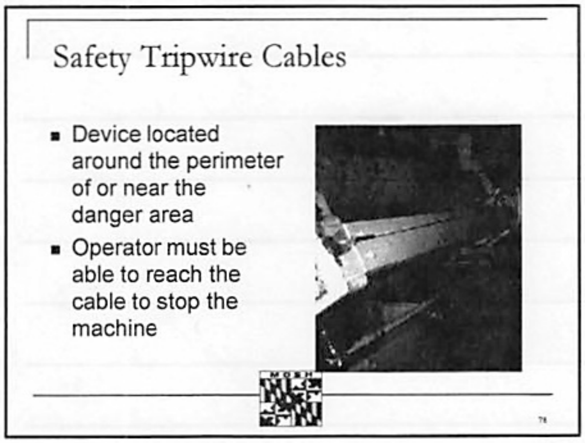
- Hands in die, feeding
- Point of operation exposed
- Pullback device attached and properly adjusted

- Die closed
- Hands withdrawn from point of operation by pullback device



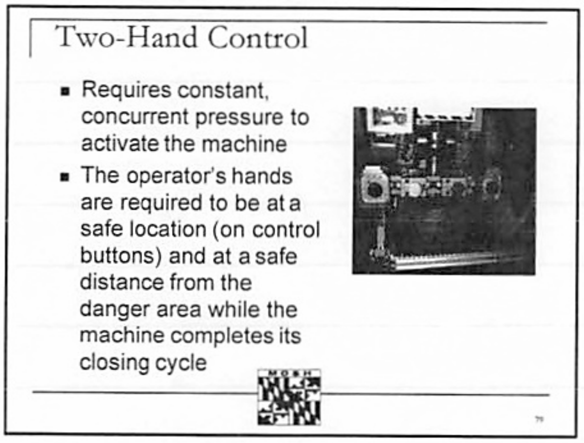
Restraint Device

- Uses cables or straps attached to the operator's hands and a fixed point
- Must be adjusted to let the operator's hands travel within a predetermined safe area
- Hand-feeding tools are often necessary if the operation involves placing material into the danger area



Safety Tripwire Cables

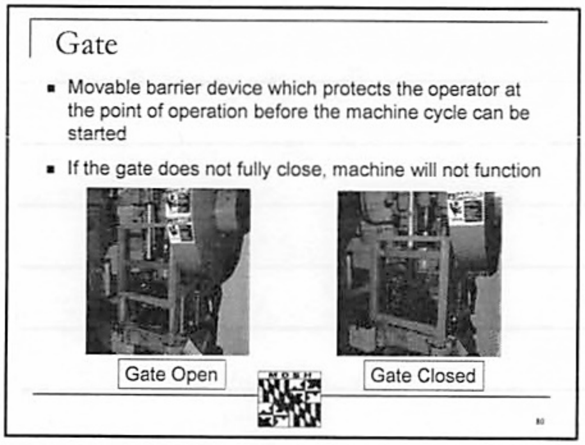
- Device located around the perimeter of or near the danger area
- Operator must be able to reach the cable to stop the machine



Two-Hand Control

- Requires constant, concurrent pressure to activate the machine
- The operator's hands are required to be at a safe location (on control buttons) and at a safe distance from the danger area while the machine completes its closing cycle

79



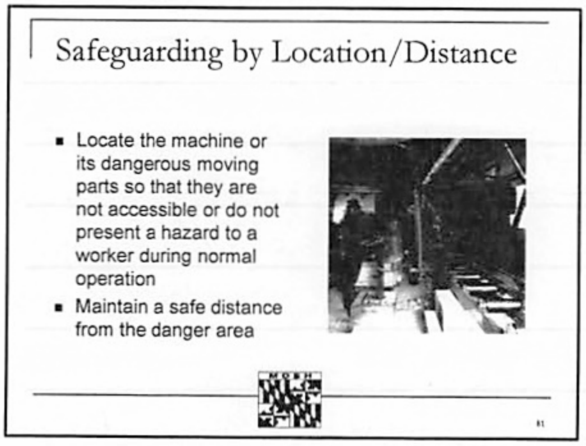
Gate

- Movable barrier device which protects the operator at the point of operation before the machine cycle can be started
- If the gate does not fully close, machine will not function

Gate Open

Gate Closed

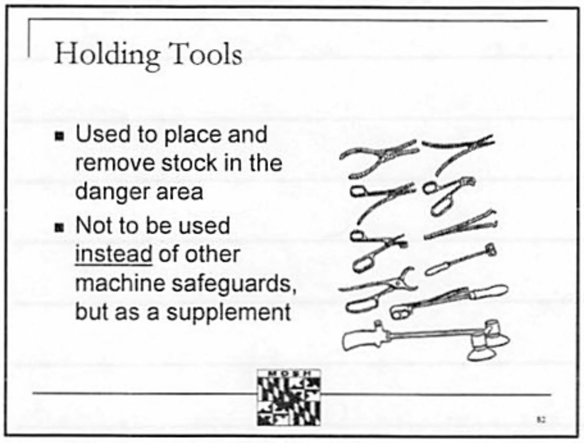
80



Safeguarding by Location/Distance

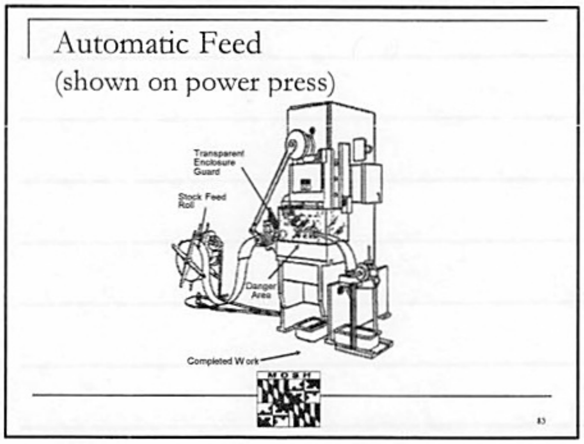
- Locate the machine or its dangerous moving parts so that they are not accessible or do not present a hazard to a worker during normal operation
- Maintain a safe distance from the danger area

81



Holding Tools

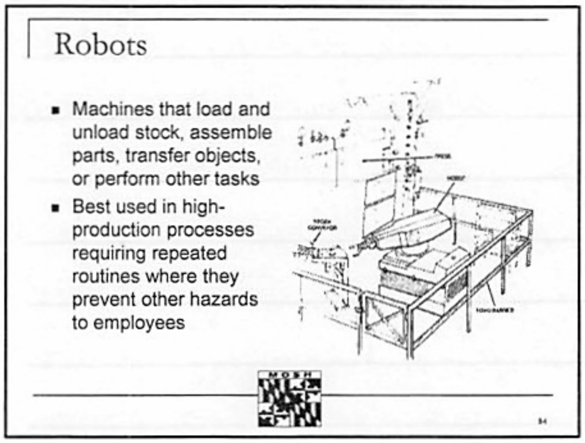
- Used to place and remove stock in the danger area
- Not to be used instead of other machine safeguards, but as a supplement



Automatic Feed

(shown on power press)

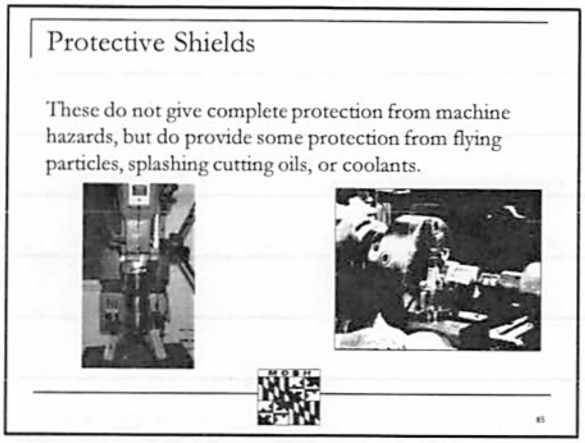
Transparent Enclosure Guard
Stock Feed Roll
Danger Area
Completed Work



Robots

- Machines that load and unload stock, assemble parts, transfer objects, or perform other tasks
- Best used in high-production processes requiring repeated routines where they prevent other hazards to employees

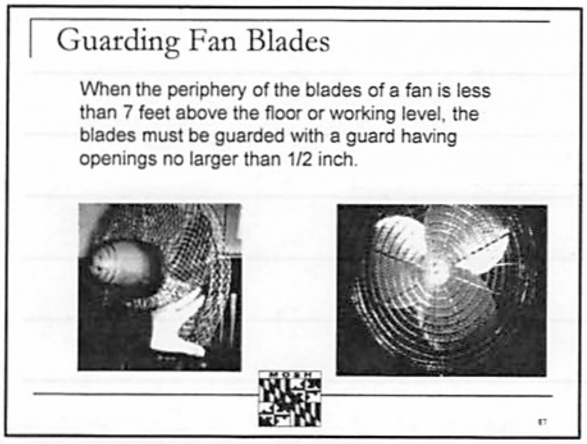
PRESS
ROBOT



Protective Shields

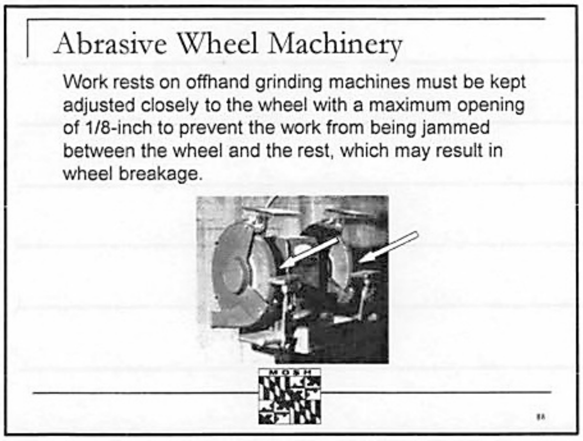
These do not give complete protection from machine hazards, but do provide some protection from flying particles, splashing cutting oils, or coolants.

Some Examples of OSHA Machine Guarding Requirements . . . .



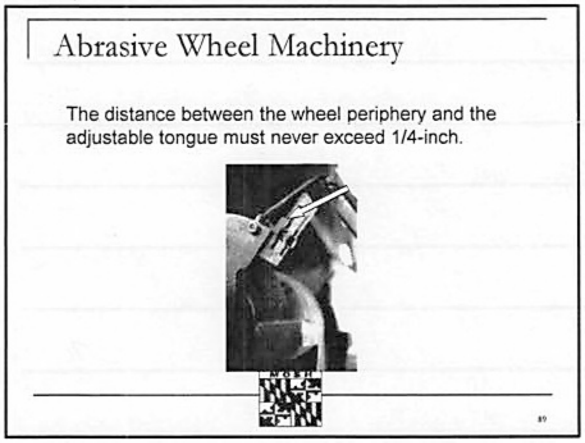
Guarding Fan Blades

When the periphery of the blades of a fan is less than 7 feet above the floor or working level, the blades must be guarded with a guard having openings no larger than 1/2 inch.



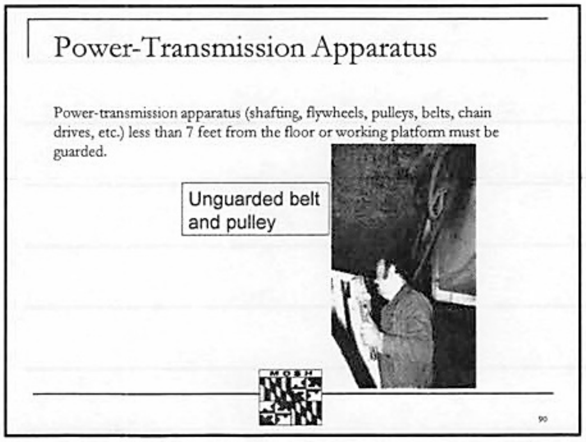
Abrasive Wheel Machinery

Work rests on offhand grinding machines must be kept adjusted closely to the wheel with a maximum opening of 1/8-inch to prevent the work from being jammed between the wheel and the rest, which may result in wheel breakage.



Abrasive Wheel Machinery

The distance between the wheel periphery and the adjustable tongue must never exceed 1/4-inch.



Power-Transmission Apparatus

Power-transmission apparatus (shafting, flywheels, pulleys, belts, chain drives, etc.) less than 7 feet from the floor or working platform must be guarded.

Unguarded belt and pulley

Machine Safety Responsibilities

- Management
  - ensure all machinery is properly guarded
- Supervisors
  - train employees on specific guard rules in their areas
  - ensure machine guards remain in place and are functional
  - immediately correct machine guard deficiencies
- Employees
  - do not remove guards unless machine is locked and tagged
  - report machine guard problems to supervisors immediately
  - do not operate equipment unless guards are in place

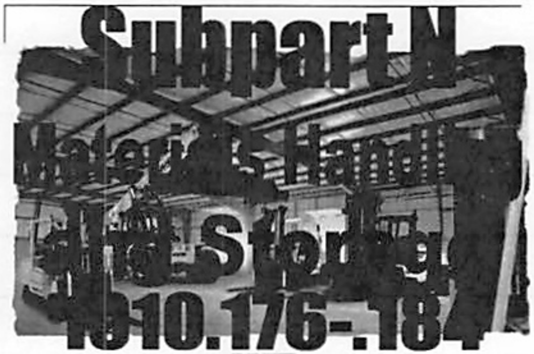
Training

- Operators should receive training on the following:
- Hazards associated with particular machines
- How the safeguards provide protection and the hazards for which they are intended
- How and why to use the safeguards
- How and when safeguards can be removed and by whom
- What to do if a safeguard is damaged, missing, or unable to provide adequate protection

Summary

- Safeguards are essential for protecting workers from needless and preventable machinery-related injuries
- The point of operation, as well as all parts of the machine that move while the machine is working, must be safeguarded
- A good rule to remember is: *Any machine part, function, or process which may cause injury must be safeguarded*

Subpart N
Materials Handling and Storage
1910.176-.184



Objectives

- Describe the requirements for secure storage of materials.
- Explain the requirements for operating powered industrial trucks.
- Indicate the requirements for operation of overhead and gantry cranes.

1910.176(a) Use of mechanical equipment

- Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made

1910.176(a) Use of mechanical equipment

- Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard

Stored material creating a hazard across the aisle

- Permanent aisles and passageways shall be appropriately marked

Secure Storage 1910.176(b)

- Storage of material shall not create a hazard
- Bags, containers, etc.., stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse

Material is not stable

1910.176(c) Housekeeping

- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage

- (e) Clearance limits:
  - Signs to warn of clearance limits shall be provided

1910.176 (g) Guards

- Covers and/or guard- rails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc..

1910.177 Servicing multi-piece and single piece rim wheels

- (a)(1) Applies to the servicing of multi-piece and single piece rim wheels used on large vehicles such as trucks, tractors, trailers, buses and off-road machines

1910.177(c) Training

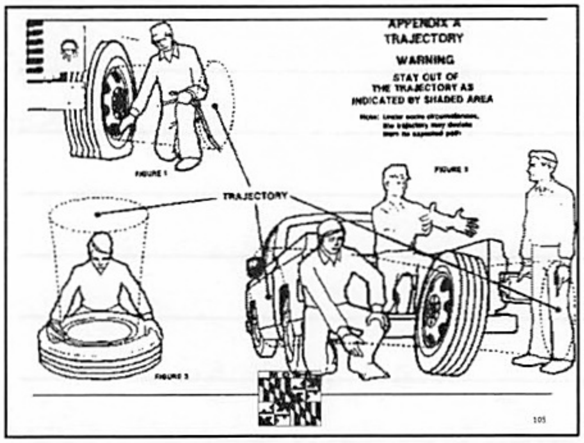
- (1)(i) The employer shall assure that no employee services any rim wheel unless the employee has been trained and instructed in
  - Correct procedures of servicing the type of wheel being serviced, and
  - In the safe operating procedures described in paragraphs (f) and (g) of this section

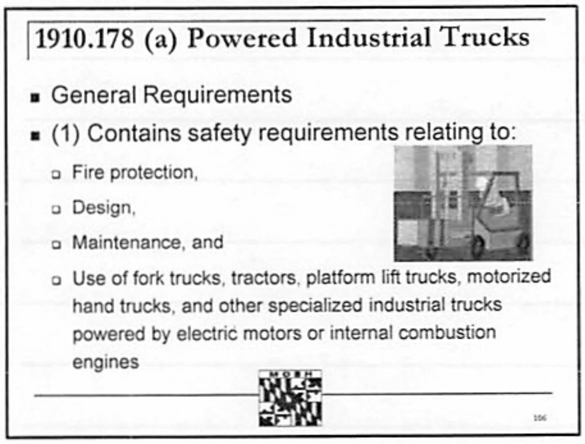
Standard Interpretations 02/27/1997 - Evaluation of an employee's ability to perform servicing of multi-piece or single piece rim wheels

- The §1910.177 standard does not specify the details of the training program, but simply requires the development and maintenance of employee proficiency in given elements of servicing. See paragraph 1910.177(c)(2).
- A mechanic's level of proficiency must be established by demonstration of his or her familiarity with and ability to use the §1910.177 standard and the charts and rim manual.

Standard Interpretations 02/27/1997 - Evaluation of an employee's ability to perform servicing of multi-piece or single piece rim wheels

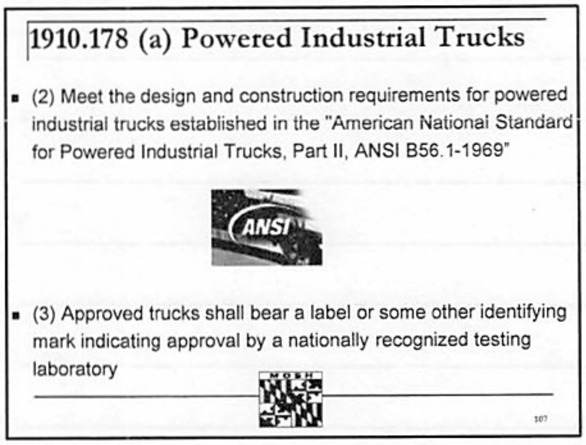
- The training provisions of the standard are stated in performance language, allowing the employer flexibility in complying with the requirement for training.
- The responsibility of providing adequate training and evaluating the employee's proficiency rests with the employer.


APPENDIX A
TRAJECTORY
WARNING
STAY OUT OF
THE TRAJECTORY AS
INDICATED BY SHADED AREA
FIGURE 1
FIGURE 2
TRAJECTORY
FIGURE 3



1910.178 (a) Powered Industrial Trucks

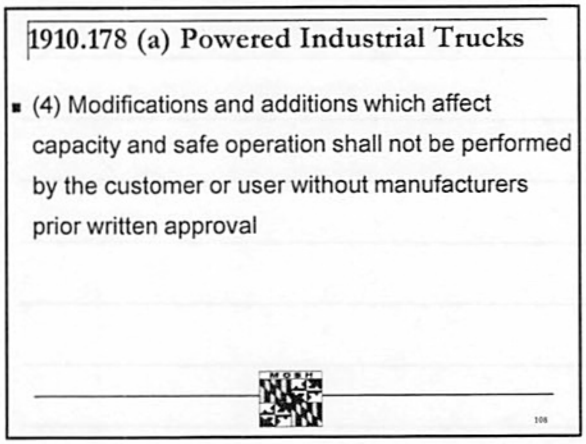
- General Requirements
- (1) Contains safety requirements relating to:
  - Fire protection,
  - Design,
  - Maintenance, and
  - Use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines



1910.178 (a) Powered Industrial Trucks

- (2) Meet the design and construction requirements for powered industrial trucks established in the "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969"

- (3) Approved trucks shall bear a label or some other identifying mark indicating approval by a nationally recognized testing laboratory

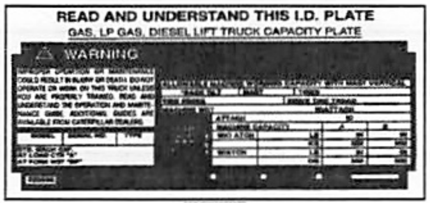


1910.178 (a) Powered Industrial Trucks

- (4) Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval

1910.178 (a) Powered Industrial Trucks

- (6) All nameplates and markings are in place and are maintained in a legible condition



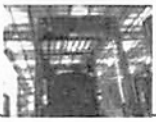
READ AND UNDERSTAND THIS I.D. PLATE

GAS, LP GAS, DIESEL LIFT TRUCK CAPACITY PLATE

WARNING

1910.178 (e) Powered Industrial Trucks

- Safety Guards
- (1) High Lift Rider trucks shall be fitted with an overhead guard…unless operations do not permit
- (2) If the type of load presents a hazard, the user shall equip fork trucks with a vertical load backrest extension



1910.178(f) Fuel Handling and Storage

- (1)The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code (NFPA No. 30-1969)
- (2)The storage and handling of liquefied petroleum gas fuel shall be in accordance with NFPA Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58-1969)

1910.178(g) Changing and Charging Storage Batteries

- (1)Battery charging installations shall be located in areas designated for that purpose
- (2)Facilities provided for
  - Flushing and neutralizing spilled electrolyte,
  - For fire protection,
  - For protecting charging apparatus from damage by trucks, and
  - For adequate ventilation for dispersal of fumes from gassing batteries

Standard Interpretations 03/08/2002 - Clarification of PIT requirements covering: LP-gas storage, and eye wash stations.

- Must LP cylinders used for internal combustion forklifts be stored outside only, or is it permissible to store them inside a warehouse or industrial building?
  : §1910.178(f)(2) addresses the storage and handling of liquified petroleum by incorporating by reference the National Fire Protection Association standard, NFPA 58-1969, ***Storage and Handling of Liquified Petroleum Gases***.
- This document lists the requirements for storage of LP cylinders in areas such as within buildings frequented by the public, buildings not frequented by the public, special buildings or rooms, and outside of buildings.

Standard Interpretations
03/08/2002 - Clarification of PIT requirements covering: LP-gas storage, and eye wash stations.

- **What regulations state how close eyewash station must be to a battery changing/charging station?**
- Because §1910.178 does not have a specific requirement for eyewash facilities, the general standard at §1910.151 applies. When necessary, facilities for drenching or flushing the eyes ***"shall be provided within the work area for immediate emergency use."***

Standard Interpretations
03/08/2002 - Clarification of PIT requirements covering: LP-gas storage, and eye wash stations

- In applying these general terms, OSHA would consider the guidelines set by such sources as American National Standards Institute (ANSI) Z358.1-1998, ***Emergency Eyewash and Shower Equipment***, which states, at section 7.4.4, that **eyewash facilities are to be located to require no more than 10 seconds to reach but that where a strong acid or caustic is used, the unit should be immediately adjacent to the hazard.**

1910.178(g) Changing and Charging Storage Batteries

- (4)A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries

1910.178(g) Changing and Charging Storage Batteries

- (5)Reinstalled batteries shall be properly positioned and secured in the truck

1910.178(g) Changing and Charging Storage Batteries

- (7)When charging batteries, acid poured into water; not water poured into acid
- (8)Trucks properly positioned and brake applied before attempting to change or charge batteries
- (9)Care taken to assure that vent caps are functioning

1910.178(g) Changing and Charging Storage Batteries

- (10)Smoking shall be prohibited in the charging area
- (11)Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas

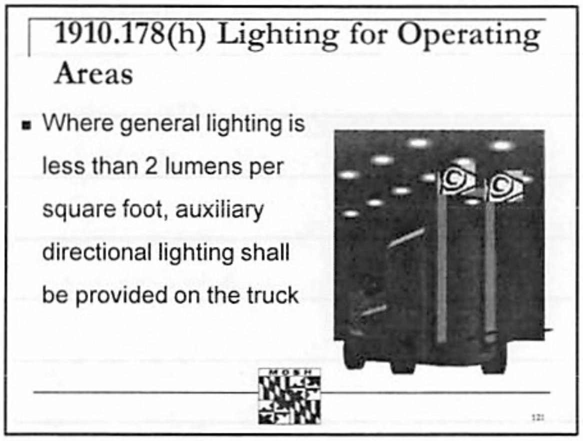
(12) Tools and metallic objects shall be kept away from the tops of batteries

DANGER

No smoking
sparks or
open flames

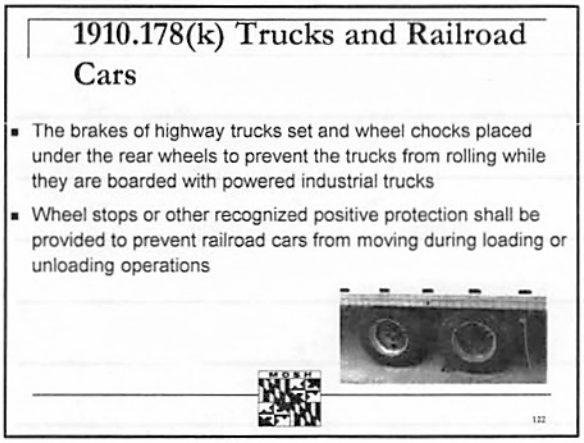
Standard Interpretations
03/08/2002 - Clarification of PIT requirements covering: smoking.

- **Are there any regulations that prohibit smoking on powered industrial trucks of any classification or fuel designation?**
- §1910.178 does not address smoking except to prohibit smoking in the battery charging areas (§1910.178(g)(10)).
- There are other OSHA standards which may apply, however, such as these dealing with the presence of flammable liquids or atmospheres or other regulated substances.



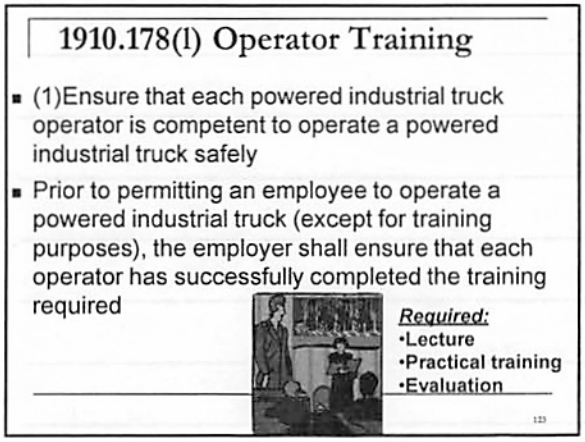
1910.178(h) Lighting for Operating Areas

- Where general lighting is less than 2 lumens per square foot, auxiliary directional lighting shall be provided on the truck



1910.178(k) Trucks and Railroad Cars

- The brakes of highway trucks set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks
- Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations



1910.178(l) Operator Training

- (1)Ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely
- Prior to permitting an employee to operate a powered industrial truck (except for training purposes), the employer shall ensure that each operator has successfully completed the training required

Required:
- •Lecture
- •Practical training
- •Evaluation

1910.178(l) Operator Training

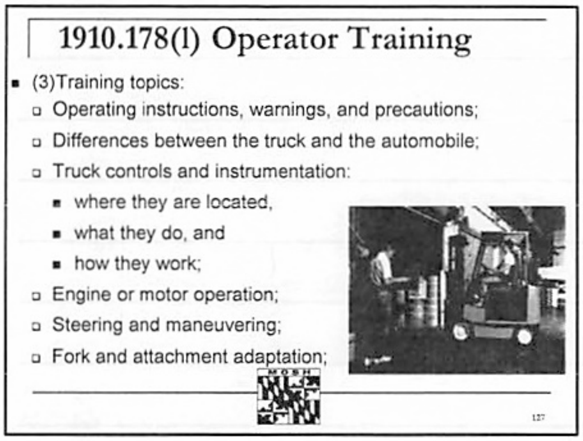
- (2)(i)Trainees may operate a powered industrial truck only:
- (A)Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence; and
- (B)Where such operation does not endanger the trainee or other employees.

1910.178(l) Operator Training

- (2)(ii)Training shall consist of a combination of:
    - **Formal instruction** (e.g., lecture, discussion, interactive computer learning, video tape, written material),
    - **Practical training** (demonstrations performed by the trainer and practical exercises performed by the trainee), and
    - **Evaluation** of the operator's performance in the workplace.

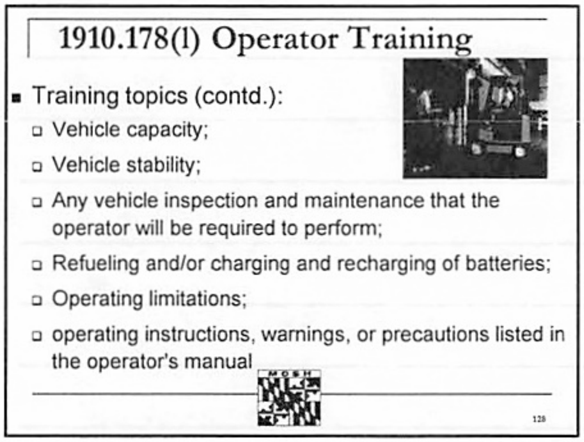
1910.178(l) Operator Training

- (2)(iii) All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.



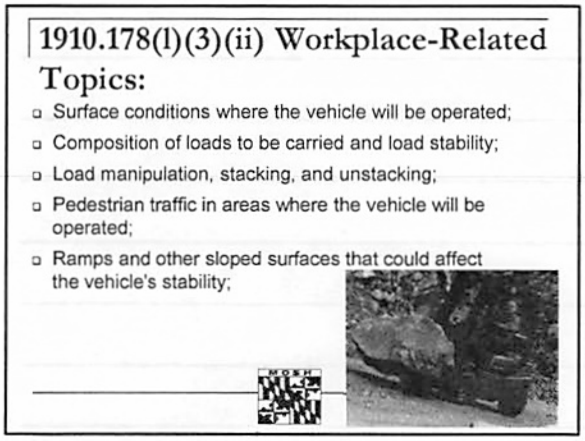
1910.178(l) Operator Training

- (3)Training topics:
  - Operating instructions, warnings, and precautions;
  - Differences between the truck and the automobile;
  - Truck controls and instrumentation:
    - where they are located,
    - what they do, and
    - how they work;
  - Engine or motor operation;
  - Steering and maneuvering;
  - Fork and attachment adaptation;



1910.178(l) Operator Training

- Training topics (contd.):
  - Vehicle capacity;
  - Vehicle stability;
  - Any vehicle inspection and maintenance that the operator will be required to perform;
  - Refueling and/or charging and recharging of batteries;
  - Operating limitations;
  - operating instructions, warnings, or precautions listed in the operator's manual



1910.178(l)(3)(ii) Workplace-Related Topics:

- Surface conditions where the vehicle will be operated;
- Composition of loads to be carried and load stability;
- Load manipulation, stacking, and unstacking;
- Pedestrian traffic in areas where the vehicle will be operated;
- Ramps and other sloped surfaces that could affect the vehicle's stability;

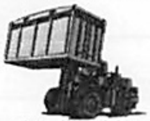
1910.178(l) Certification

- (6)The certification shall include:
  - The name of the operator;
  - The date of the training;
  - The date of the evaluation, and;
  - The identity of the person(s) the training or evaluation

PIT
Training
&
Evaluation

1910.178(m) Truck Operations

- (1)Trucks never driven up to anyone standing in front of a bench or other fixed object
- (2)No one allowed to stand or pass under the elevated portion of any truck, ***whether loaded or empty***



- (3)Unauthorized personnel not permitted to ride on powered industrial trucks
- A safe place to ride provided where riding of trucks is authorized

1910.178(m) Truck Operations

- (4)Prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the truck
- (5)(i)Truck left unattended, load engaging means fully lowered, controls neutralized, power shall be shut off, and brakes set*

***A powered industrial truck is unattended when the operator is 25 ft. or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view**

1910.178(m) Truck Operations

- (6)A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car.
- Trucks shall not be used for opening or closing freight doors.
- (7)Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading.
- (7)The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.

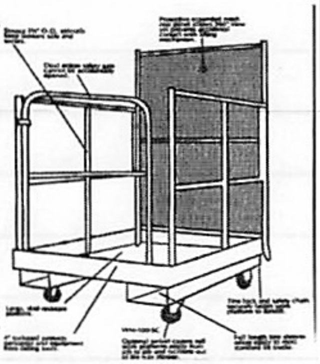
1910.178(m) Truck Operations

- (9)An overhead guard shall be used as protection against falling objects.

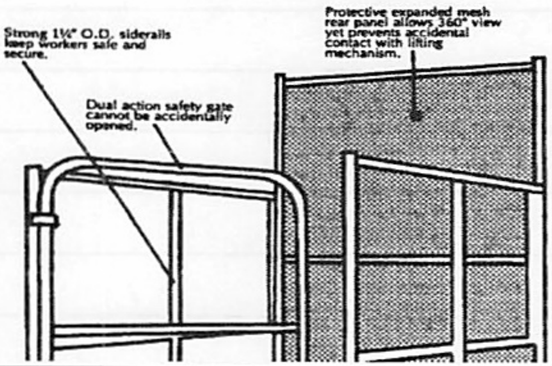
- It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.

1910.178(m) Truck Operations

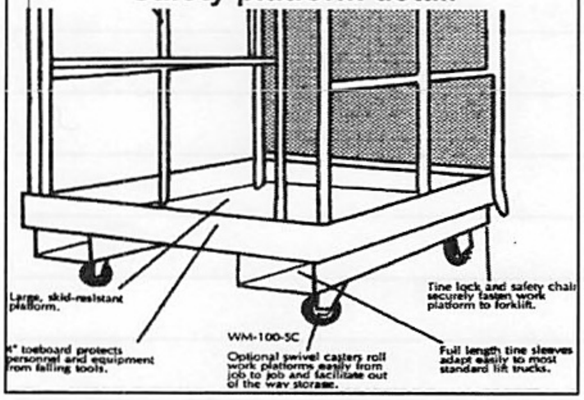
- (12)(i)Use of a safety platform firmly secured to the lifting carriage and/or forks
- (ii)Means shall be provided whereby personnel on the platform can shut off power to the truck



Safety platform detail


Strong 1¼" O.D. siderails keep workers safe and secure.
Protective expanded mesh rear panel allows 360° view yet prevents accidental contact with lifting mechanism.
Dual action safety gate cannot be accidentally opened.

Safety platform detail


Large, skid-resistant platform.
4" toeboard protects personnel and equipment from falling tools.
WM-100-5C
Optional swivel casters roll work platforms easily from job to job and facilitate out of the way storage.
Tine lock and safety chai securely fasten work platform to forklift.
Full length tine sleeves adapt easily to most standard lift trucks.

Standard Interpretations
03/08/2002 - Clarification of PIT requirements covering: fall protection and safety platforms

- Are safety platforms attached to the forks of a forklift considered aerial lifts?
  No, Aerial devices (aerial lifts) are covered under §1910.67, ***Vehicle-mounted Elevating and Rotating Work Platforms***. An aerial device is any vehicle-mounted device that telescopes, articulates or both, which is used to position personnel. A platform attached to the forks of a forklift would not be considered an aerial lift.

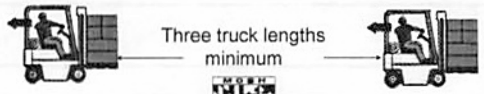
Standard Interpretations
03/08/2002 - Clarification of PIT requirements covering: fall protection and safety platforms

- **Are workers required to wear fall protection (full body harness and lanyard) when they are up in a safety platform that has a standard guardrail, mid-rail and toe plate?**
  No, personal fall protection equipment would not be required when a guardrail system is installed along the open sides of the safety platform.

1910.178(n) Traveling

- (1)All traffic regulations shall be observed, including authorized plant speed limits;
- A safe distance shall be maintained ***approximately three truck lengths*** from the truck ahead, and;
- The truck shall be kept under control at all times

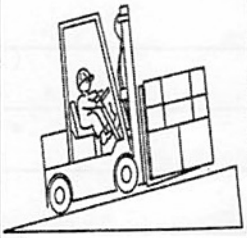
Speed Limit 5mph



1910.178(n) Traveling

- (3)Other trucks traveling in the same direction at intersections, blind spots, or other dangerous locations shall not be passed
- (4)Driver required to slow down and sound horn at cross aisles and other locations where vision is obstructed
- (4)If the load being carried obstructs forward view, driver shall travel with the load trailing

1910.178(n) Traveling



- (7)(i)Ascending or descending grades in excess of 10 percent, loaded trucks driven with the load upgrade

  (7)(iii)On all grades the load and load engaging means tilted back if applicable, and raised only as far as necessary to clear the road surface

1910.178(n) Traveling

- (11)Dockboard or bridgeplates, shall be properly secured before they are driven over.
- (11)Dockboard or bridgeplates shall be driven over carefully and slowly and their rated capacity never exceeded.

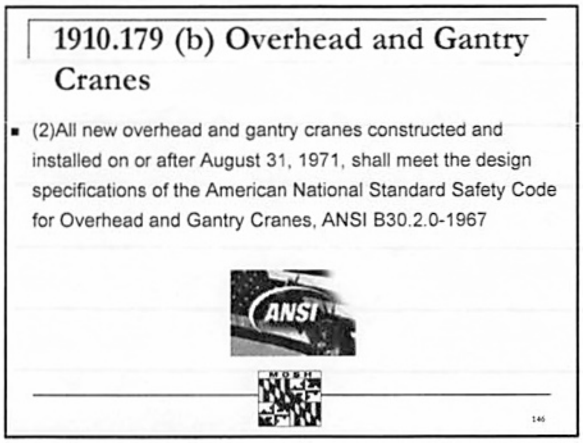
Dockboard not secured

1910.179(b) Overhead and Gantry Cranes

- General requirements:
- (1)Applies to overhead and gantry cranes, including:
  - semigantry,
  - cantilever gantry,
  - wall cranes,
  - storage bridge cranes,
  - and others having the same fundamental characteristics
- These cranes are grouped because they all have trolleys and similar travel characteristics

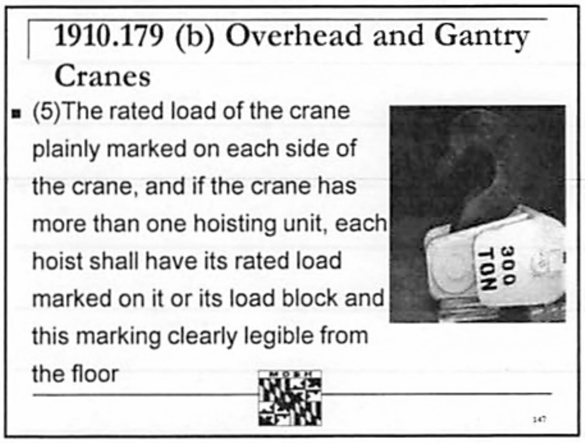
Standard Interpretations
03/04/1991 - Clarification of OSHA standard on Overhead and Gantry Cranes

- **Does this standard apply to underhung cranes, hoists, and monorails?**
- This standard does not apply to underhung cranes, overhead hoists, or monorails. Underhung cranes and monorails are covered in ANSI B30.11-1980, a National Consensus Standard. Under 1910.179 a hoist is defined as an apparatus which may be a part of an applicable crane, exerting a force for lifting or lowering. Requirements for hoisting equipment can be found in 1910.179(h)(1).



1910.179 (b) Overhead and Gantry Cranes

- (2)All new overhead and gantry cranes constructed and installed on or after August 31, 1971, shall meet the design specifications of the American National Standard Safety Code for Overhead and Gantry Cranes, ANSI B30.2.0-1967



1910.179 (b) Overhead and Gantry Cranes

- (5)The rated load of the crane plainly marked on each side of the crane, and if the crane has more than one hoisting unit, each hoist shall have its rated load marked on it or its load block and this marking clearly legible from the floor

1910.179 (b) Overhead and Gantry Cranes

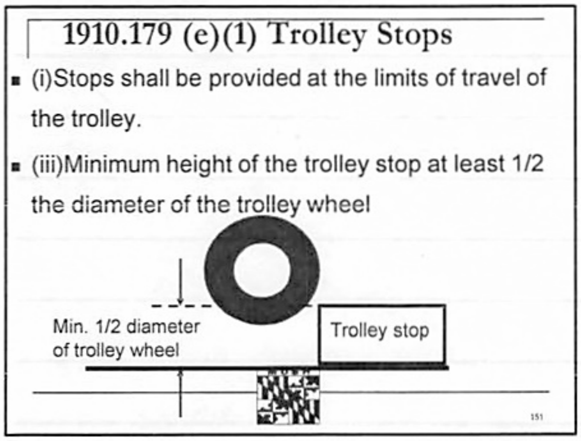
- (8)Only designated personnel shall be permitted to operate a crane

Standard Interpretations 11/08/1999 - Training for travel lift (mobile gantry crane) operators

- Please be advised that 29 CFR 1910.179(b)(8) requires that only **designated** personnel be permitted to operate a crane. OSHA defines **designated** at 1910.179(a)(35) as:
- Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties [emphasis added].
- Because the term "qualified" is not itself defined, OSHA would interpret "qualified" in light of operator-qualifications provisions of industry standards such as **ANSI B30.2.**

1910.179 (c) Cabs

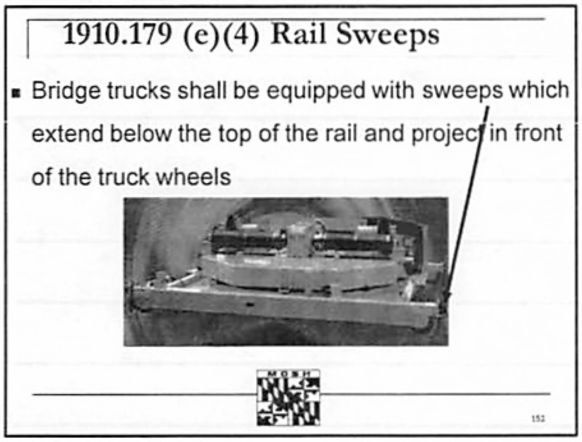
- (2) Access to crane. Access to the cab and/or bridge walkway shall be by a conveniently placed fixed ladder, stairs, or platform requiring no step over any gap exceeding 12 inches.
- (2)Fixed ladders shall be in conformance with the American National Standard Safety Code for Fixed Ladders, ANSI A14.3-1956, which is incorporated by reference as specified in Sec. 1910.6.



1910.179 (e)(1) Trolley Stops

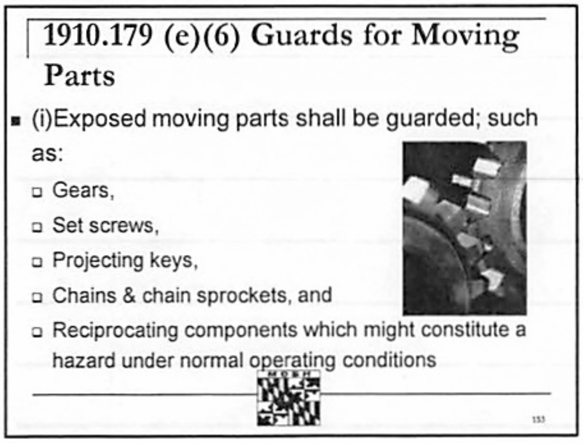
- (i)Stops shall be provided at the limits of travel of the trolley.
- (iii)Minimum height of the trolley stop at least 1/2 the diameter of the trolley wheel

Min. 1/2 diameter of trolley wheel
Trolley stop



1910.179 (e)(4) Rail Sweeps

- Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the truck wheels



1910.179 (e)(6) Guards for Moving Parts

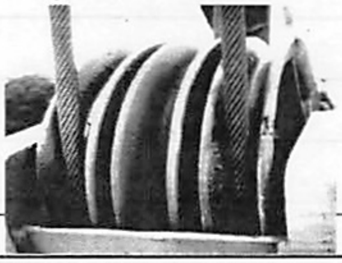
- (i)Exposed moving parts shall be guarded; such as:
  - Gears,
  - Set screws,
  - Projecting keys,
  - Chains & chain sprockets, and
  - Reciprocating components which might constitute a hazard under normal operating conditions

1910.179 (g) Electric Equipment

- (3)(vi)For floor-operated cranes, the controller or controllers if rope operated, shall automatically return to the "off" position when released by the operator
- (5)Power supply to runway conductors capable of being locked out

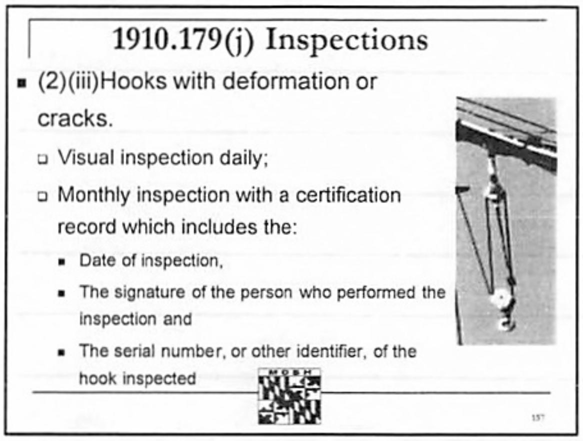
1910.179 (h) Hoisting Equipment

- (1)(i)Sheave grooves shall be smooth and free from surface defects which could cause rope damage.



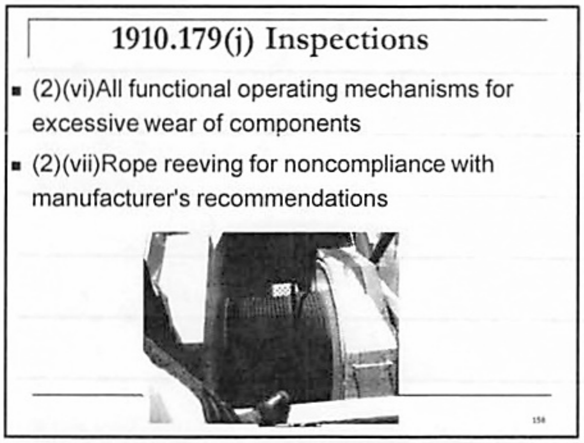
1910.179(j) Inspections

- (1)(i)Initial inspection. Prior to initial use all new and altered cranes shall be inspected to insure compliance with the provisions of this section.
- (1)(ii)(a)Frequent inspection - Daily to monthly intervals:
    - including observation during operation
- (1)(ii)(b)Periodic inspection - 1 to 12-month intervals
- (2)(i)All functional operating mechanisms for maladjustment interfering with proper operation. Daily.
- (2)(ii)Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems. Daily.



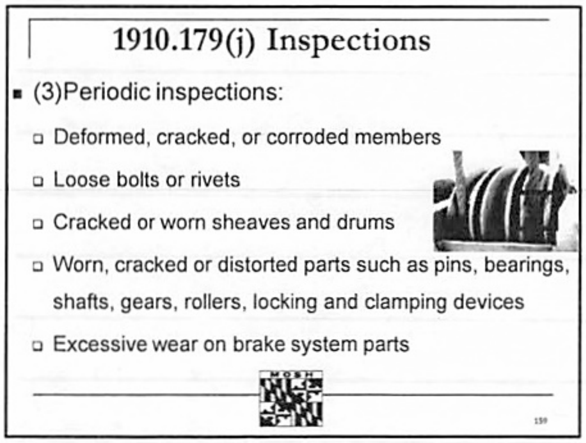
1910.179(j) Inspections

- (2)(iii)Hooks with deformation or cracks.
  - Visual inspection daily;
  - Monthly inspection with a certification record which includes the:
    - Date of inspection,
    - The signature of the person who performed the inspection and
    - The serial number, or other identifier, of the hook inspected



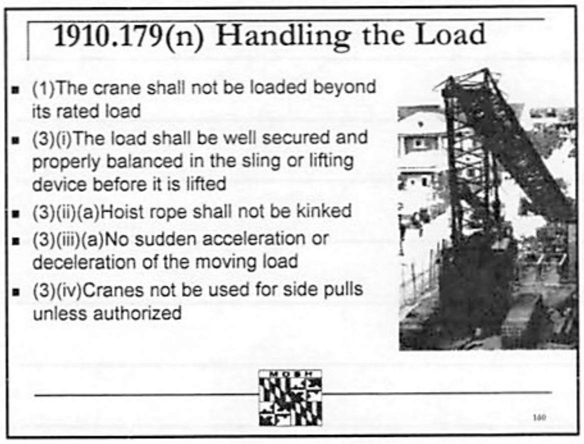
1910.179(j) Inspections

- (2)(vi)All functional operating mechanisms for excessive wear of components
- (2)(vii)Rope reeving for noncompliance with manufacturer's recommendations



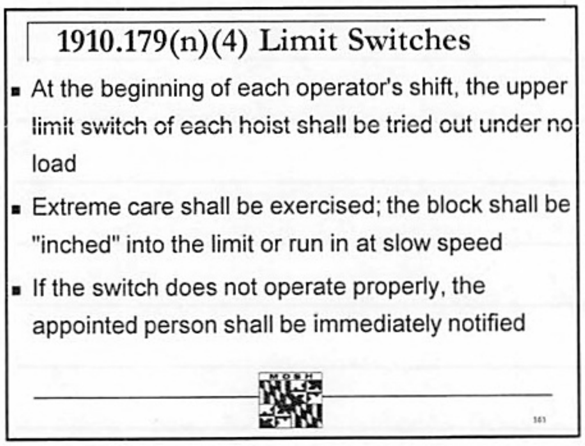
1910.179(j) Inspections

- (3)Periodic inspections:
  - Deformed, cracked, or corroded members
  - Loose bolts or rivets
  - Cracked or worn sheaves and drums
  - Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices
  - Excessive wear on brake system parts



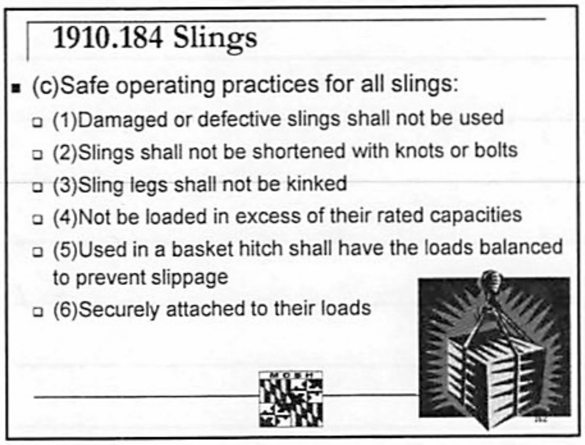
1910.179(n) Handling the Load

- (1)The crane shall not be loaded beyond its rated load
- (3)(i)The load shall be well secured and properly balanced in the sling or lifting device before it is lifted
- (3)(ii)(a)Hoist rope shall not be kinked
- (3)(iii)(a)No sudden acceleration or deceleration of the moving load
- (3)(iv)Cranes not be used for side pulls unless authorized



1910.179(n)(4) Limit Switches

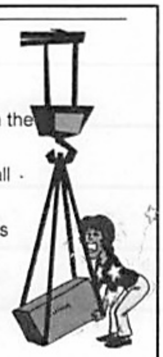
- At the beginning of each operator's shift, the upper limit switch of each hoist shall be tried out under no load
- Extreme care shall be exercised; the block shall be "inched" into the limit or run in at slow speed
- If the switch does not operate properly, the appointed person shall be immediately notified



1910.184 Slings

- (c)Safe operating practices for all slings:
  - (1)Damaged or defective slings shall not be used
  - (2)Slings shall not be shortened with knots or bolts
  - (3)Sling legs shall not be kinked
  - (4)Not be loaded in excess of their rated capacities
  - (5)Used in a basket hitch shall have the loads balanced to prevent slippage
  - (6)Securely attached to their loads

1910.184 Slings



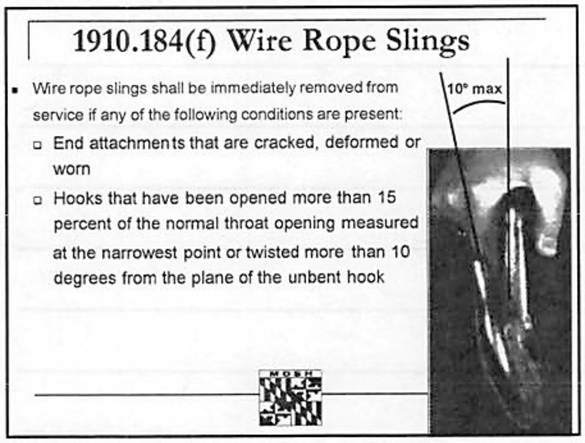
- (c)Safe operating practices for all slings:
  - (7)Slings shall be padded or protected from the sharp edges of their loads
  - (8)Suspended loads shall be kept clear of all obstructions
  - (9)All employees shall be kept clear of loads about to be lifted and of suspended loads
  - (10)Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load

1910.184(d) Inspections

- Each day before being used, the sling and all fastenings and attachments inspected for damage or defects by a *competent person designated by the employer*
- Additional inspections performed during sling use, where service conditions warrant
- Damaged or defective slings shall be immediately removed from service

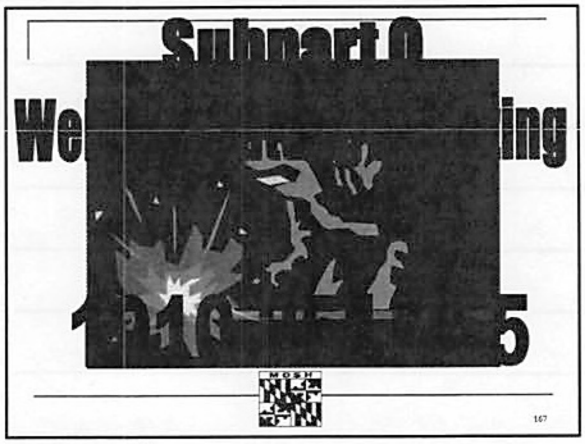
1910.184(f) Wire Rope Slings

- Wire rope slings shall be immediately removed from service if any of the following conditions are present:
  - Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay
  - Wear or scraping of one-third the original diameter of outside individual wires
  - Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure
  - Evidence of heat damage



1910.184(f) Wire Rope Slings

- Wire rope slings shall be immediately removed from service if any of the following conditions are present:
  - End attachments that are cracked, deformed or worn
  - Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook



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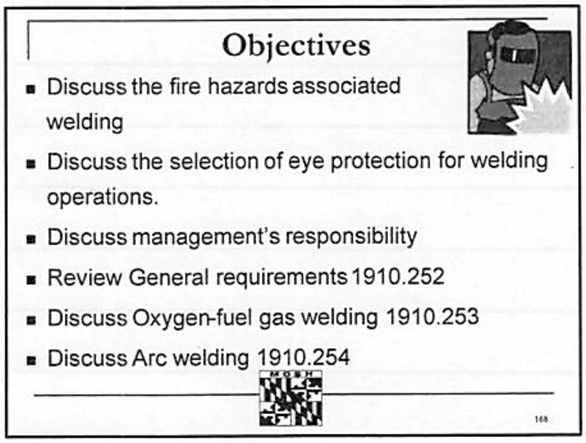
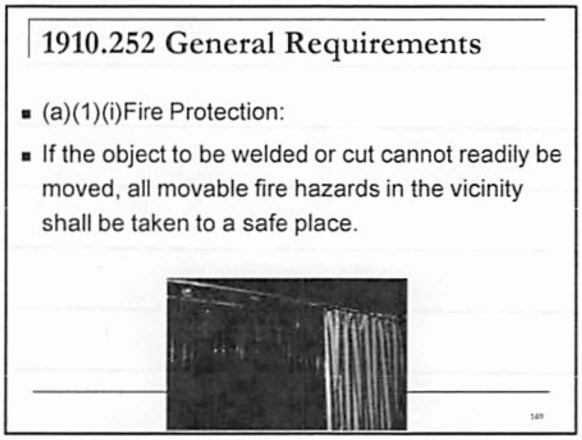


Objectives

- Discuss the fire hazards associated welding
- Discuss the selection of eye protection for welding operations.
- Discuss management's responsibility
- Review General requirements 1910.252
- Discuss Oxygen-fuel gas welding 1910.253
- Discuss Arc welding 1910.254



1910.252 General Requirements

- (a)(1)(i)Fire Protection:
- If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.

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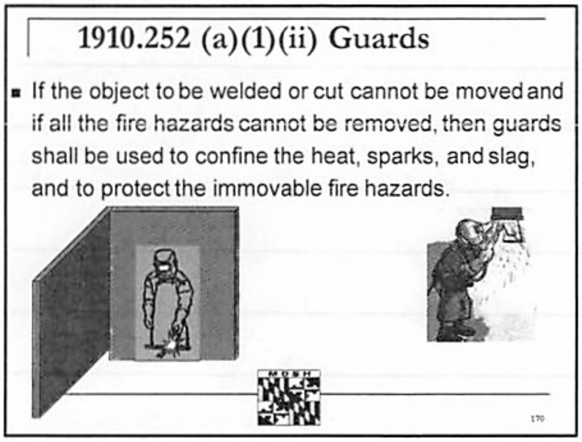

1910.252 (a)(1)(ii) Guards

- If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

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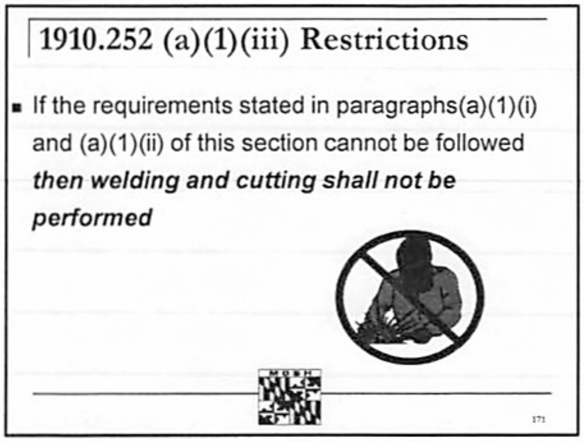

1910.252 (a)(1)(iii) Restrictions

- If the requirements stated in paragraphs(a)(1)(i) and (a)(1)(ii) of this section cannot be followed ***then welding and cutting shall not be performed***

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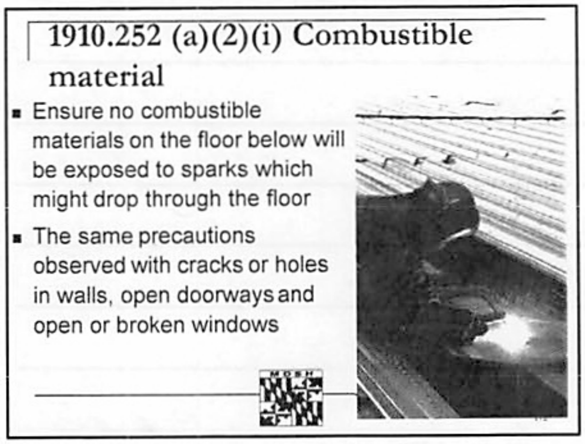
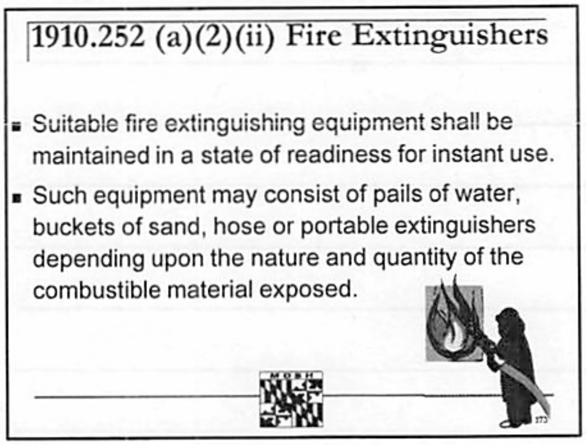


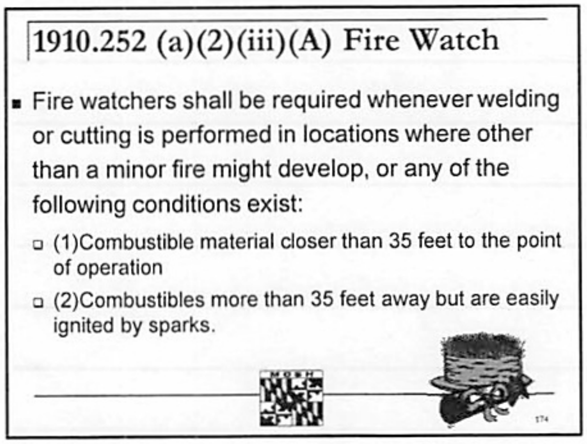
1910.252 (a)(2)(i) Combustible material

- Ensure no combustible materials on the floor below will be exposed to sparks which might drop through the floor
- The same precautions observed with cracks or holes in walls, open doorways and open or broken windows



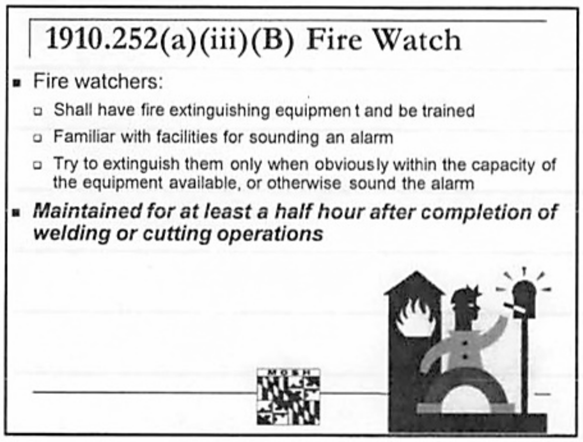
1910.252 (a)(2)(ii) Fire Extinguishers

- Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use.
- Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.



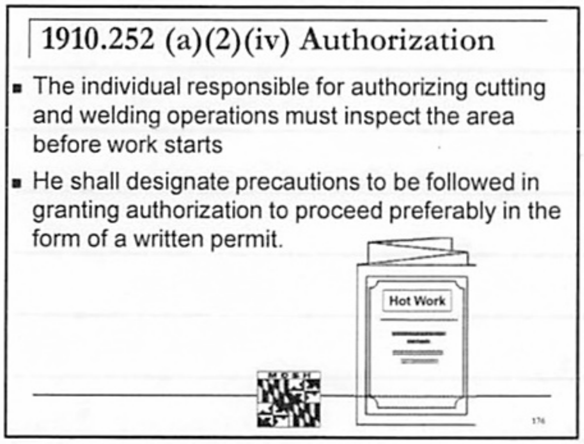
1910.252 (a)(2)(iii)(A) Fire Watch

- Fire watchers shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:
  - (1)Combustible material closer than 35 feet to the point of operation
  - (2)Combustibles more than 35 feet away but are easily ignited by sparks.



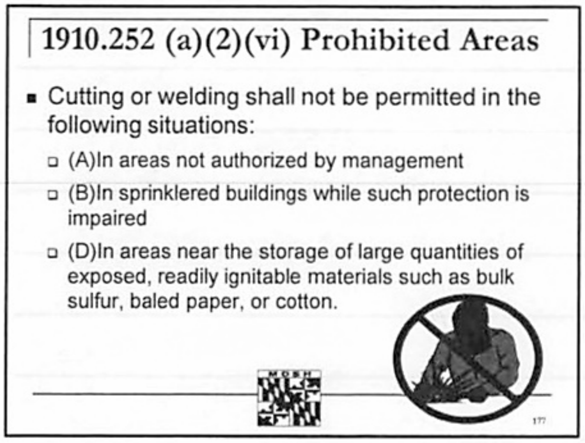
1910.252(a)(iii)(B) Fire Watch

- Fire watchers:
  - Shall have fire extinguishing equipment and be trained
  - Familiar with facilities for sounding an alarm
  - Try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm
- ***Maintained for at least a half hour after completion of welding or cutting operations***



1910.252 (a)(2)(iv) Authorization

- The individual responsible for authorizing cutting and welding operations must inspect the area before work starts
- He shall designate precautions to be followed in granting authorization to proceed preferably in the form of a written permit.



1910.252 (a)(2)(vi) Prohibited Areas

- Cutting or welding shall not be permitted in the following situations:
  - (A)In areas not authorized by management
  - (B)In sprinklered buildings while such protection is impaired
  - (D)In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

1910.252 (a)(2)(vi) Prohibited Areas

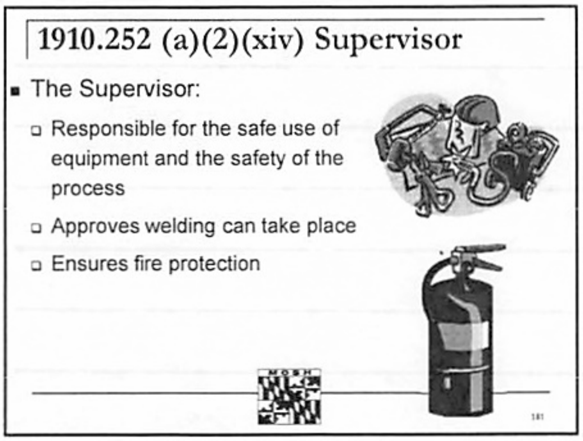
- Cutting or welding shall not be permitted in the following situations:
  - (C)In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air),
  - (C)or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or in areas with an accumulation of combustible dusts.

1910.252 (a)(2)(viii) Ducts

- Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

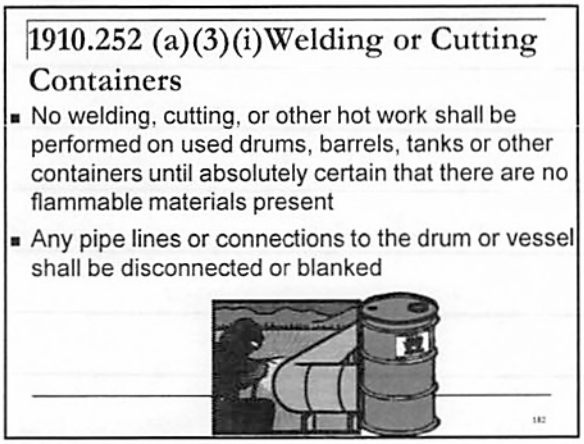
1910.252 (a)(2)(xiii) Management

- Management responsibility for the safe usage of cutting and welding equipment
  - (A) Establish areas for cutting and welding (B)Designate an individual responsible for authorizing cutting and welding operations.
  - (C)Ensure personnel are properly trained
  - (D)Advise all contractors about flammable materials



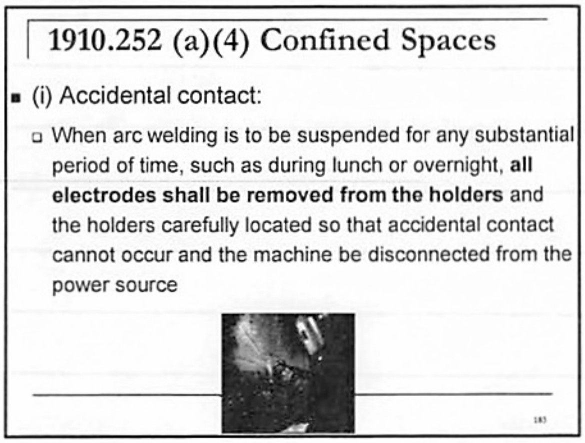
1910.252 (a)(2)(xiv) Supervisor

- The Supervisor:
  - Responsible for the safe use of equipment and the safety of the process
  - Approves welding can take place
  - Ensures fire protection



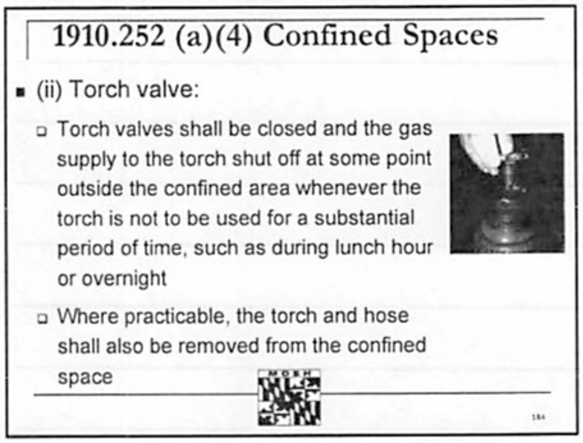
1910.252 (a)(3)(i)Welding or Cutting Containers

- No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks or other containers until absolutely certain that there are no flammable materials present
- Any pipe lines or connections to the drum or vessel shall be disconnected or blanked



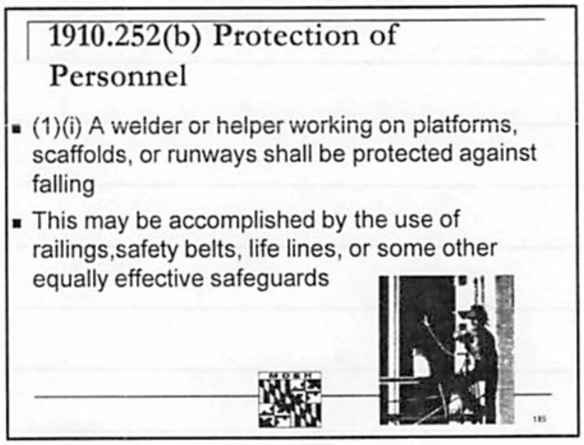
1910.252 (a)(4) Confined Spaces

- (i) Accidental contact:
  - When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, **all electrodes shall be removed from the holders** and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source



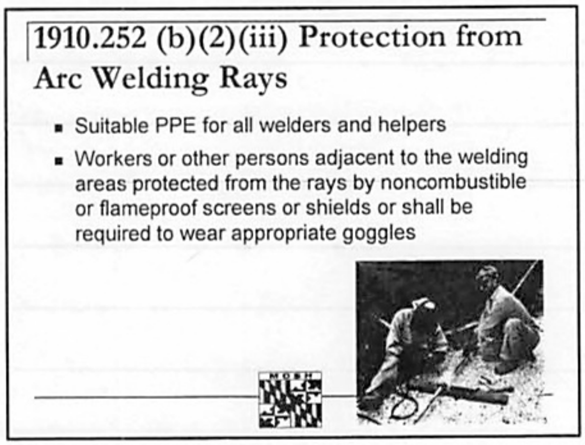
1910.252 (a)(4) Confined Spaces

- (ii) Torch valve:
  - Torch valves shall be closed and the gas supply to the torch shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight
  - Where practicable, the torch and hose shall also be removed from the confined space



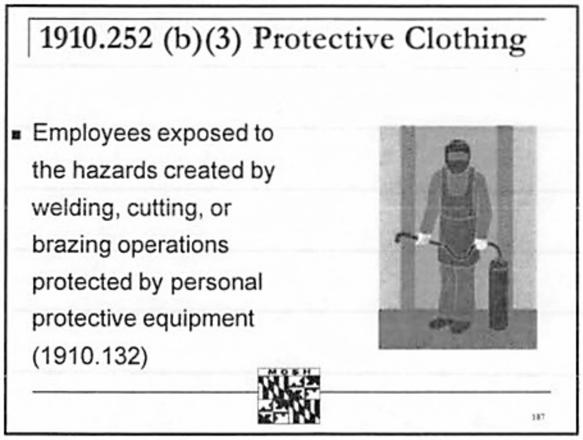
1910.252(b) Protection of Personnel

- (1)(i) A welder or helper working on platforms, scaffolds, or runways shall be protected against falling
- This may be accomplished by the use of railings,safety belts, life lines, or some other equally effective safeguards



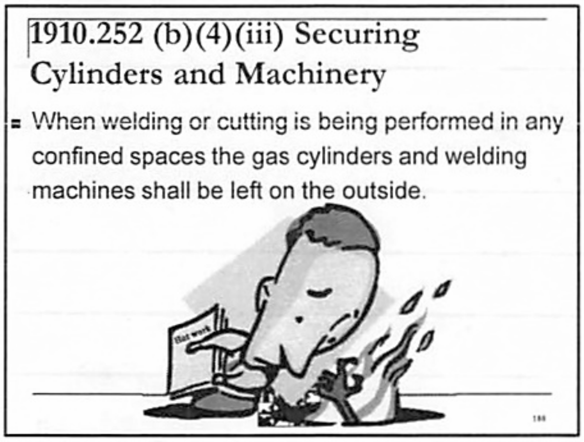
1910.252 (b)(2)(iii) Protection from Arc Welding Rays

- Suitable PPE for all welders and helpers
- Workers or other persons adjacent to the welding areas protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles



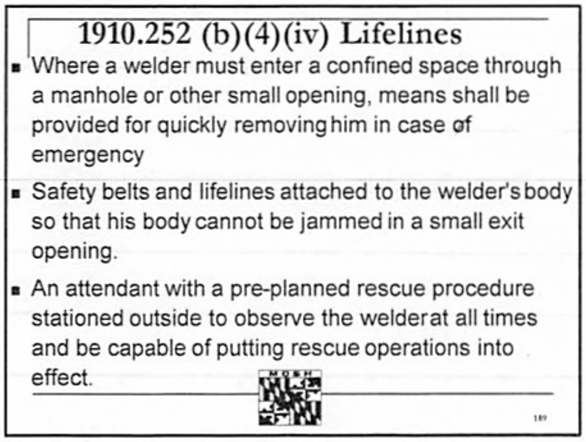
1910.252 (b)(3) Protective Clothing

- Employees exposed to the hazards created by welding, cutting, or brazing operations protected by personal protective equipment (1910.132)



1910.252 (b)(4)(iii) Securing Cylinders and Machinery

- When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines shall be left on the outside.



1910.252 (b)(4)(iv) Lifelines

- Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency
- Safety belts and lifelines attached to the welder's body so that his body cannot be jammed in a small exit opening.
- An attendant with a pre-planned rescue procedure stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

Standard Interpretations 07/30/1993 - Conflict between requirements of 1910.252 and 1910.146

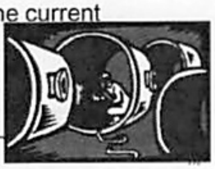
- Section 1910.252(b)(4)(iv) requires that an attendant be stationed outside a confined space which a welder must enter through a manhole or other small opening "to observe" the welder at all times.
- However, Appendix C of 1910.146 lists "tapping or rapping codes on tank walls" as an example of an adequate means of communication and observation between an attendant and a welder working in a permit-required confined space.

Standard Interpretations 07/30/1993 - Conflict between requirements of 1910.252 and 1910.146

- The present requirement in 1910.252(b)(4)(iv) is based upon a similar requirement in an out-of-date voluntary standard (ANSI Z49.1-1967). The most recent version (1988) of the same ANSI standard contains language which is slightly different than that contained in the older version.
- The newer voluntary standard states that the attendant shall "observe the workers inside **or be in constant communication with them.**"

Standard Interpretations 07/30/1993 - Conflict between requirements of 1910.252 and 1910.146

- We believe that "tapping on tank walls" can be an adequate means of communication between an entrant and an attendant.
- OSHA will accept the use of the tapping procedure on the walls of tanks in lieu of the more burdensome requirement in the current 1910.252(b)(4)(iv).



1910.252 (b)(4)(vii) Warning Sign

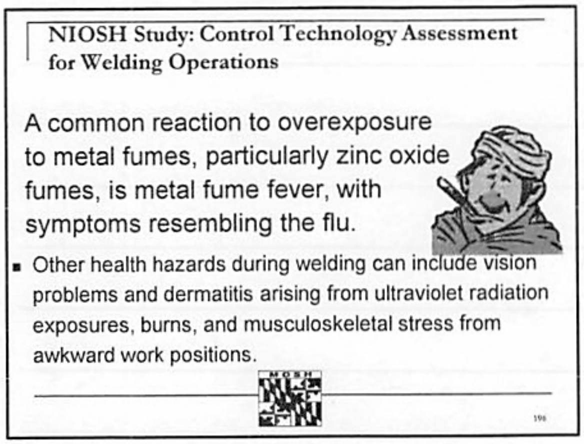
- After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

1910.252 (c) Health Protection & Ventilation

- Three factors govern the amount of contamination to which welders may be exposed:
  - (1)(i)(A)Dimensions of space
  - (1)(i)(B)Number of welders
  - (1)(i)(C)Possible evolution of hazardous fumes
- Management responsible to ensure welders have proper protection & ventilation

NIOSH Study: Control Technology Assessment for Welding Operations

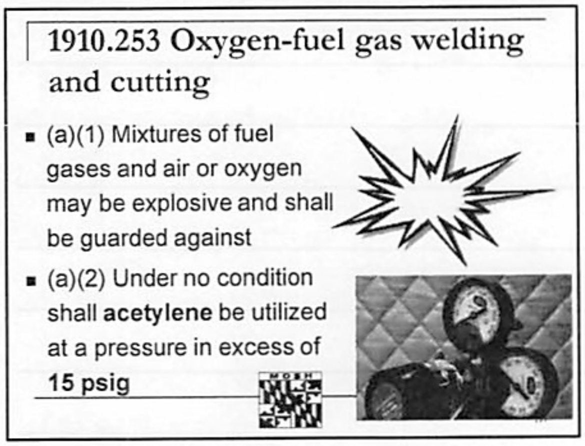
- Epidemiological evidence indicates that welders generally have a 40 percent increase in relative risk of developing lung cancer as a result of their work.
- Other cancers associated with welding include leukemia, cancer of the stomach, brain, nasal sinus, and pancreas.
- Cadmium poisoning can affect the respiratory system and damage the liver and kidneys.



NIOSH Study: Control Technology Assessment for Welding Operations

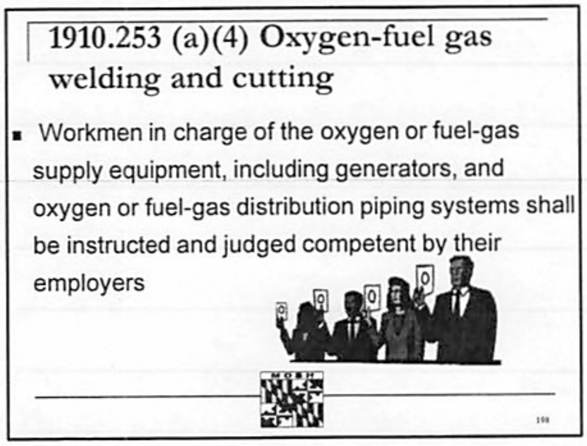
A common reaction to overexposure to metal fumes, particularly zinc oxide fumes, is metal fume fever, with symptoms resembling the flu.

- Other health hazards during welding can include vision problems and dermatitis arising from ultraviolet radiation exposures, burns, and musculoskeletal stress from awkward work positions.



1910.253 Oxygen-fuel gas welding and cutting

- (a)(1) Mixtures of fuel gases and air or oxygen may be explosive and shall be guarded against
- (a)(2) Under no condition shall **acetylene** be utilized at a pressure in excess of **15 psig**



1910.253 (a)(4) Oxygen-fuel gas welding and cutting

- Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers

Standard Interpretations 05/13/1998 - Training and competency for oxygen-fuel gas welding equipment

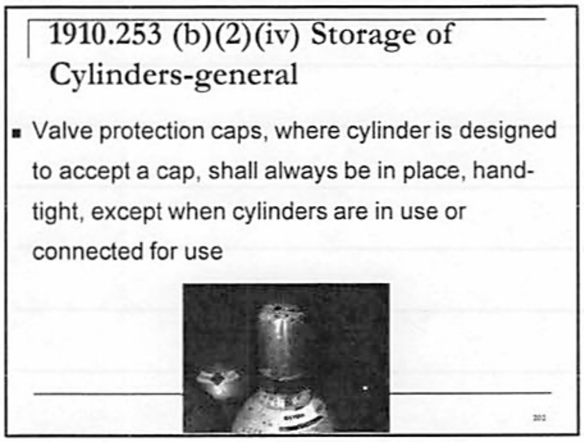
- A workmen who is trained and demonstrates proficiency in following the rules and instructions required under paragraph 1910.253(a)(4) would be considered competent to perform the duties of a workman in charge of an oxygen-fuel gas welding or cutting system.
- The aforementioned rules and instructions must incorporate requirements under §1910.252 and §1910.253 of Subpart Q-Welding, Cutting and Brazing and any other employer determined safety and health requirements that are applicable to the particular workplace application.

1910.253 (b)(1)(ii) Oxygen-fuel gas welding and cutting

- Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas

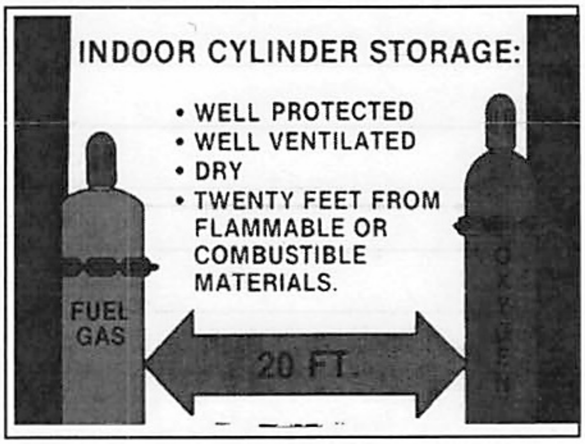
1910.253 (b)(2) Storage of Cylinders-general

- (i)Kept away from radiators and other sources of heat
- (ii)Stored in a well-protected, well-ventilated, dry location, at least 20 (6.1 m) feet from highly combustible materials
- (iii)Empty cylinders shall have their valves closed



1910.253 (b)(2)(iv) Storage of Cylinders-general

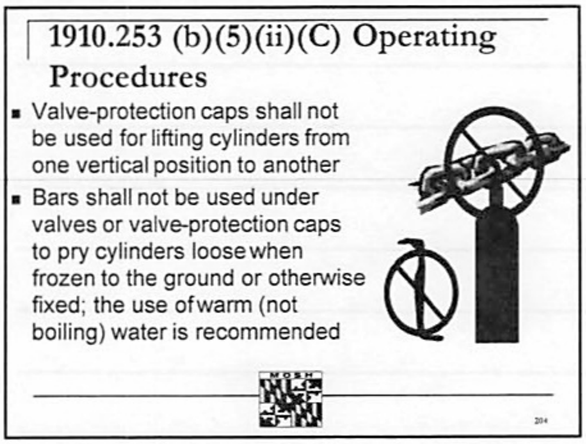
- Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use



INDOOR CYLINDER STORAGE:

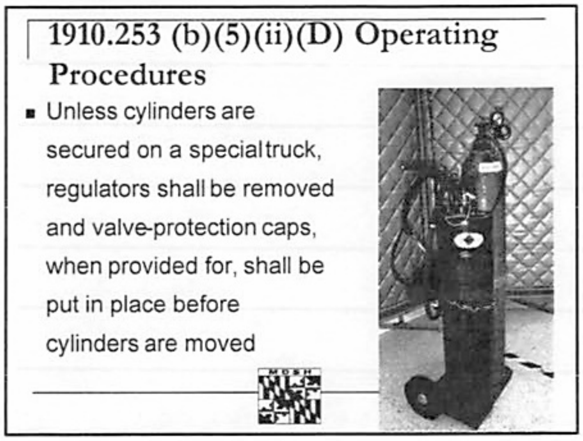
- WELL PROTECTED
- WELL VENTILATED
- DRY
- TWENTY FEET FROM FLAMMABLE OR COMBUSTIBLE MATERIALS.

FUEL GAS
20 FT.
OXYGEN



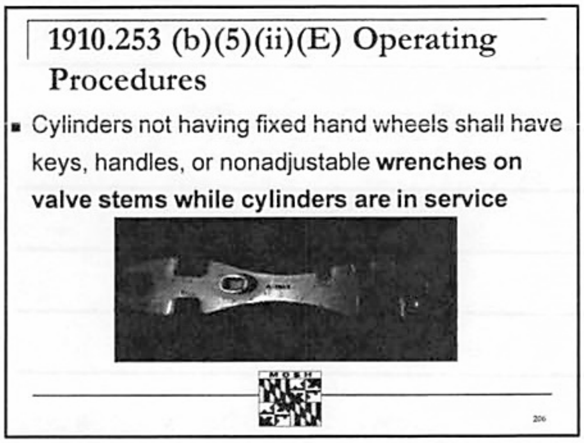
1910.253 (b)(5)(ii)(C) Operating Procedures

- Valve-protection caps shall not be used for lifting cylinders from one vertical position to another
- Bars shall not be used under valves or valve-protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended



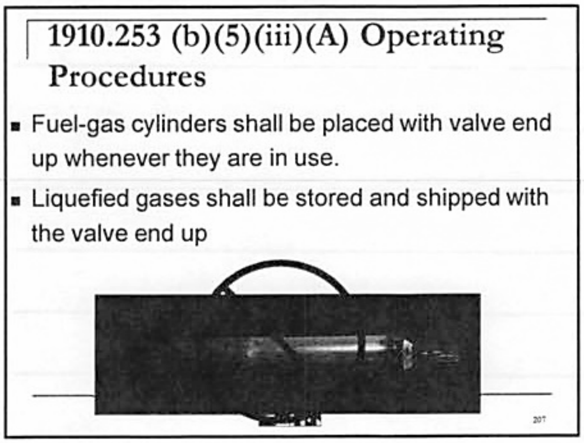
1910.253 (b)(5)(ii)(D) Operating Procedures

- Unless cylinders are secured on a special truck, regulators shall be removed and valve-protection caps, when provided for, shall be put in place before cylinders are moved



1910.253 (b)(5)(ii)(E) Operating Procedures

- Cylinders not having fixed hand wheels shall have keys, handles, or nonadjustable **wrenches on valve stems while cylinders are in service**



1910.253 (b)(5)(iii)(A) Operating Procedures

- Fuel-gas cylinders shall be placed with valve end up whenever they are in use.
- Liquefied gases shall be stored and shipped with the valve end up

1910.253 (b)(5)(iii)(C) Operating Procedures

- Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately
- The valve shall be opened while standing to one side of the outlet; never in front of it
- Never crack a fuel-gas cylinder valve near other welding work or near sparks, flame, or other possible sources of ignition

1910.253 (b)(5)(iii) Operating Procedures

- (J)The cylinder valve shall always be opened slowly
- (K)An acetylene cylinder valve shall not be opened more than one and one-half turns of the spindle, and preferably no more than three-fourths of a turn

1910.253 (e)(5) Hose and Hose Connections

- (i)Hose for oxy-fuel gas service shall comply with the Specification for Rubber Welding Hose, 1958, Compressed Gas Association
- (ii)When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than 4 inches (10.2 cm) out of 12 inches covered by tape

1910.254 Arc Welding and Cutting

- Assurance of consideration of safety in design is obtainable by choosing apparatus complying with the:
    - Requirements for Electric Arc-Welding Apparatus,
    - NEMA EW-1-1962,
    - National Electrical Manufacturers Association or the Safety Standard for Transformer-Type Arc-Welding Machines,
    - ANSI C33.2-1956,
    - Underwriters' Laboratories,

1910.254 (d)(1) Arc Welding and Cutting

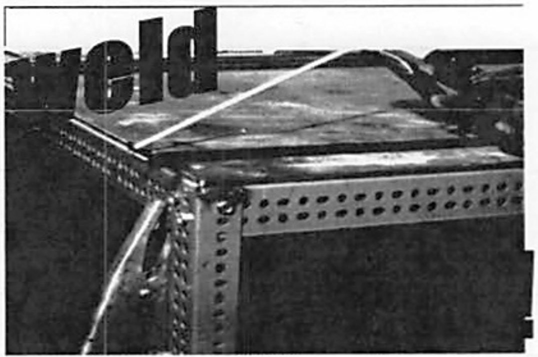
- Workmen assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of this section and with 1910.252 (a), (b), and (c) of this part

1910.254 (d)(2) Arc Welding and Cutting

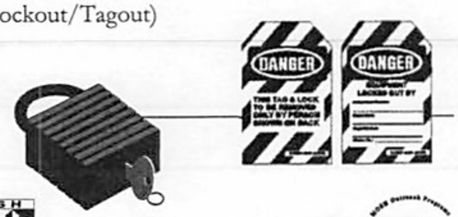
- Before starting operations all connections to the machine shall be checked to make certain they are properly made
- The work lead shall be firmly attached to the work; magnetic work clamps shall be freed from adherent metal particles of spatter on contact surfaces
- Coiled welding cable shall be spread out before use to avoid serious overheating and damage to insulation.

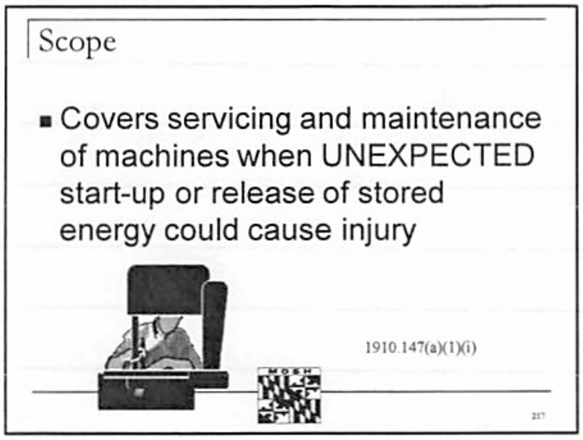
1910.254 (d) Arc Welding and Cutting

- (7)Electrode holders when not in use shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks
- (8)Cables with splices within 10 feet (3 m) of the holder shall not be used
- The welder should not coil or loop welding electrode cable around parts of his body



29 CFR 1910.147
Control of Hazardous Energy (Lockout/Tagout)

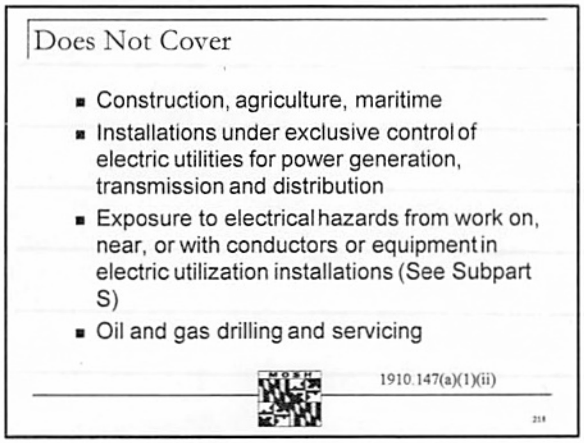

DANGER
THIS TAG & LOCK TO BE REMOVED ONLY BY PERSON SHOWN ON BACK
DANGER
LOCKED OUT BY



Scope

- Covers servicing and maintenance of machines when UNEXPECTED start-up or release of stored energy could cause injury

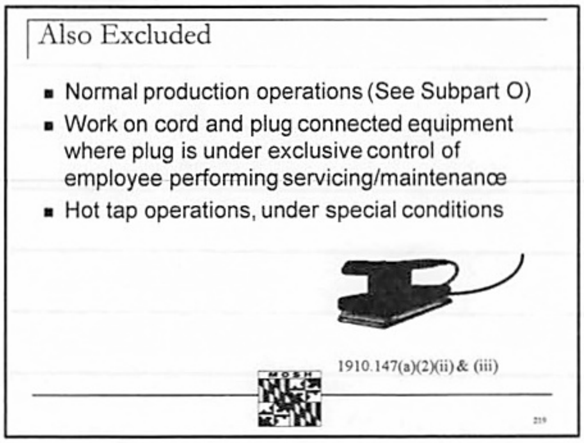
1910.147(a)(1)(i)



Does Not Cover

- Construction, agriculture, maritime
- Installations under exclusive control of electric utilities for power generation, transmission and distribution
- Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations (See Subpart S)
- Oil and gas drilling and servicing

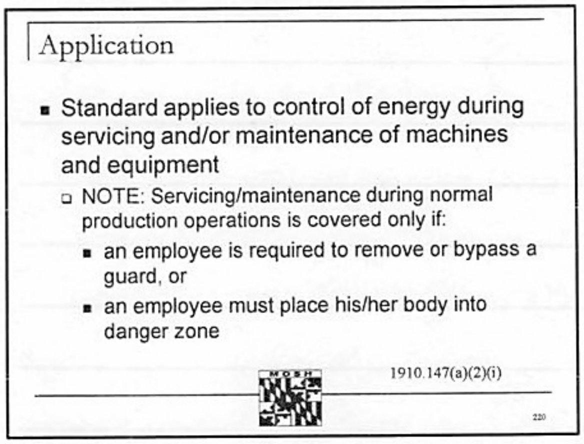
1910.147(a)(1)(ii)



Also Excluded

- Normal production operations (See Subpart O)
- Work on cord and plug connected equipment where plug is under exclusive control of employee performing servicing/maintenance
- Hot tap operations, under special conditions

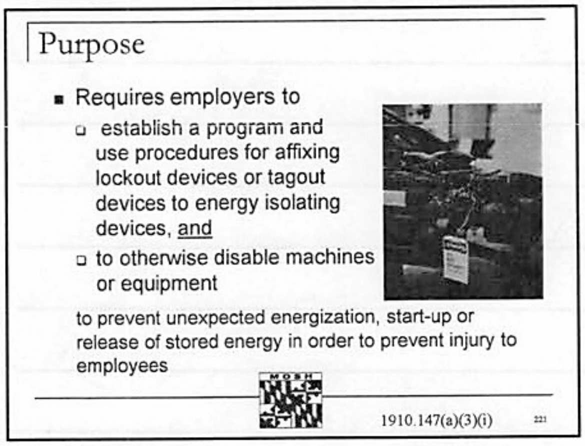
1910.147(a)(2)(ii) & (iii)



Application

- Standard applies to control of energy during servicing and/or maintenance of machines and equipment
  - NOTE: Servicing/maintenance during normal production operations is covered only if:
    - an employee is required to remove or bypass a guard, or
    - an employee must place his/her body into danger zone

1910.147(a)(2)(i)

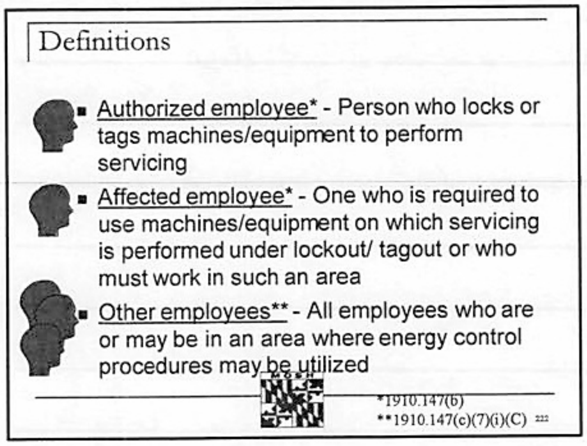


Purpose

- Requires employers to
  - establish a program and use procedures for affixing lockout devices or tagout devices to energy isolating devices, and
  - to otherwise disable machines or equipment

to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees

1910.147(a)(3)(i)



Definitions

- Authorized employee* - Person who locks or tags machines/equipment to perform servicing
- Affected employee* - One who is required to use machines/equipment on which servicing is performed under lockout/ tagout or who must work in such an area
- Other employees** - All employees who are or may be in an area where energy control procedures may be utilized

*1910.147(b)
**1910.147(c)(7)(i)(C)

Definitions (continued)

- Capable of being locked out
  - Designed with hasp or attachment to which lock can be affixed; or,
  - Has locking mechanism built in; or
  - Lockout can be achieved without need to dismantle, rebuild, replace or permanently alter

1910.147(b)

Definitions (continued)

- Energized - Connected to an energy source, or containing residual or stored energy
- Energy isolating device - A mechanical device that physically prevents the transmission or release of energy
- Energy source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy

1910.147(b)

Definitions (continued)

- Lockout - The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the device and the equipment being controlled cannot be operated until the lockout device is removed
- Lockout device - A device that utilizes a positive means, such as a lock, to hold an energy isolating device in a safe position and prevent energization

1910.147(b)

Definitions (continued)

- Normal production operations - Utilization of a machine or equipment to perform its intended function
- Servicing and/or maintenance - Includes lubrication, cleaning or unjamming, making adjustments and tool changes, where employees may be exposed to **unexpected** energization, start-up, or release of hazardous energy

1910.147(b)

Definitions (continued)

- Tagout - Placement of a tagout device on an energy isolating device to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed
- Tagout device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device to indicate that the energy isolating device and equipment being controlled may not be operated until the tagout device is removed

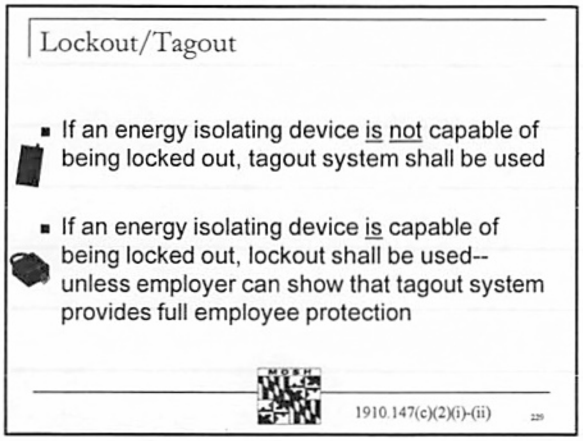
1910.147(b)

Energy Control Program

- The employer shall establish a program consisting of
  - **an energy control procedure,**
  - **employee training, and**
  - **periodic inspections**

  to ensure that, before any employee performs servicing or maintenance on a machine or equipment where the unexpected energizing, start up or release of stored energy could cause injury, the machine or equipment **shall be isolated from the energy source, and rendered inoperative**

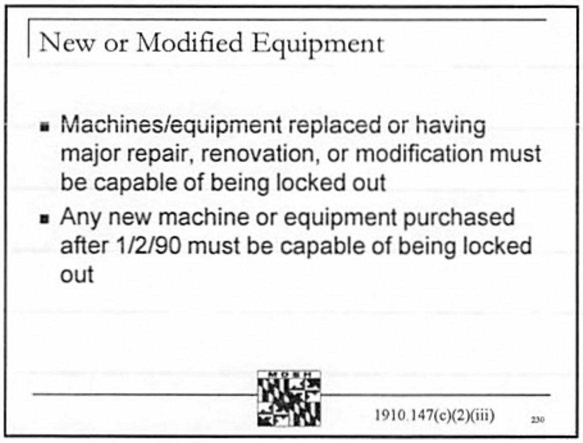
1910.147(c)(1)



Lockout/Tagout

- If an energy isolating device is not capable of being locked out, tagout system shall be used
- If an energy isolating device is capable of being locked out, lockout shall be used--unless employer can show that tagout system provides full employee protection

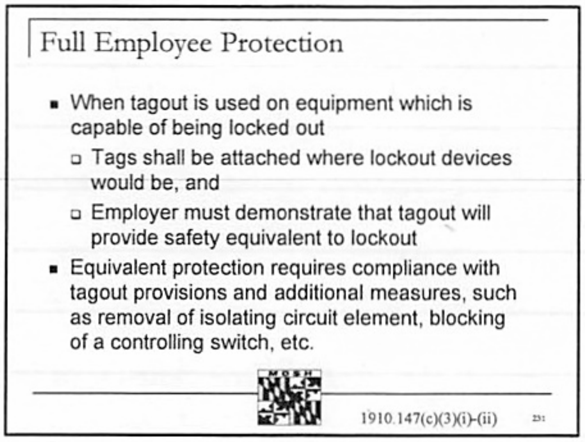
1910.147(c)(2)(i)-(ii)



New or Modified Equipment

- Machines/equipment replaced or having major repair, renovation, or modification must be capable of being locked out
- Any new machine or equipment purchased after 1/2/90 must be capable of being locked out

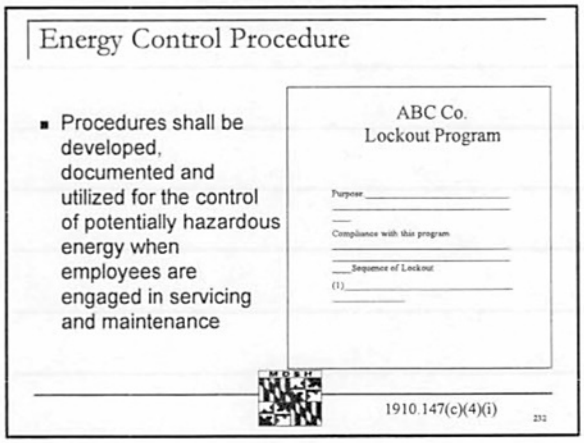
1910.147(c)(2)(iii)



Full Employee Protection

- When tagout is used on equipment which is capable of being locked out
  - Tags shall be attached where lockout devices would be, and
  - Employer must demonstrate that tagout will provide safety equivalent to lockout
- Equivalent protection requires compliance with tagout provisions and additional measures, such as removal of isolating circuit element, blocking of a controlling switch, etc.

1910.147(c)(3)(i)-(ii)



Energy Control Procedure

- Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in servicing and maintenance

ABC Co.
Lockout Program

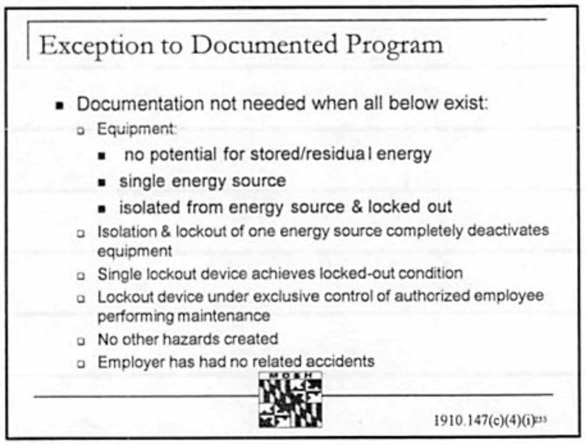
Purpose ____________

Compliance with this program

___Sequence of Lockout

(1)____________

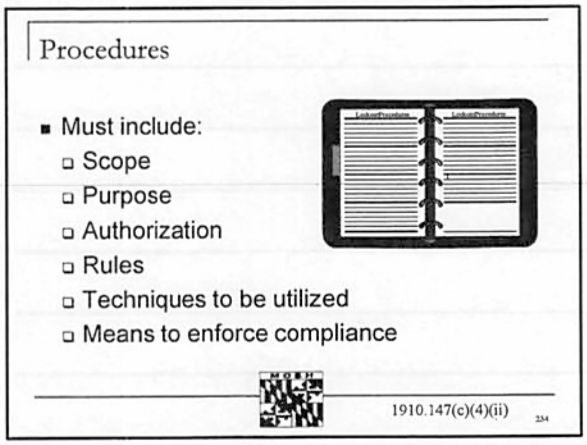
1910.147(c)(4)(i)



Exception to Documented Program

- Documentation not needed when all below exist:
  - ☐ Equipment:
    - no potential for stored/residual energy
    - single energy source
    - isolated from energy source & locked out
  - ☐ Isolation & lockout of one energy source completely deactivates equipment
  - ☐ Single lockout device achieves locked-out condition
  - ☐ Lockout device under exclusive control of authorized employee performing maintenance
  - ☐ No other hazards created
  - ☐ Employer has had no related accidents

1910.147(c)(4)(i)



Procedures

- Must include:
  - ☐ Scope
  - ☐ Purpose
  - ☐ Authorization
  - ☐ Rules
  - ☐ Techniques to be utilized
  - ☐ Means to enforce compliance

1910.147(c)(4)(ii)

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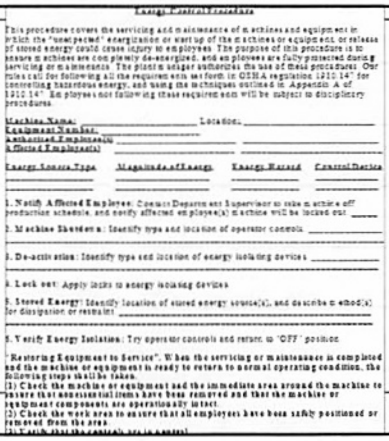


Energy Control Procedure

This procedure covers the servicing and maintenance of machines and equipment in which the "unexpected" energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. The purpose of this procedure is to ensure machines are completely de-energized, and employees are fully protected during servicing or maintenance. The plant manager authorizes the use of these procedures. Our rules call for following all the requirements set forth in OSHA regulation 1910.147 for controlling hazardous energy, and using the techniques outlined in Appendix A of 1910.147. Employees not following these requirements will be subject to disciplinary procedures.

Machine Name: ____________ Location: ____________
Equipment Number: ____________
Authorized Employee(s) ____________ ____________
Affected Employee(s) ____________ ____________

Energy Source Type	Magnitude of Energy	Energy Hazard	Control Device

1. Notify Affected Employees: Contact Department Supervisor to take machine off production schedule, and notify affected employee(s) machine will be locked out ____

2. Machine Shutdown: Identify type and location of operator controls ____________

3. De-activation: Identify type and location of energy isolating devices ____________

4. Lock out: Apply locks to energy isolating devices

5. Stored Energy: Identify location of stored energy source(s), and describe method(s) for dissipation or restraint ____________

6. Verify Energy Isolation: Try operator controls and return to "OFF" position

"Restoring Equipment to Service". When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.
(1) Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.
(3) Verify that the controls are in neutral

Materials/Hardware

- Provided by employer
- Singularly identified
- Only devices used
- Not used for other purposes
- Durable
- Standardized
- Substantial

1910.147(c)(5)

Periodic Inspection

- At least annually
- Performed by authorized employee [other than the one(s) using procedure being inspected]
- Designed to correct deficiencies
- **LOCKOUT:** Must review each authorized employee's responsibilities
- **TAGOUT:** Must review each authorized and affected employee's responsibilities and additional training requirements of 1910.147(c)(7)(ii)
- Employer certification required

1910.147(c)(6)(i)

Training - Authorized Employee

- Training shall include:
  - Recognition of hazardous energy sources
  - Type & magnitude of energy in workplace
  - Methods for energy isolation/control

1910.147(c)(7)(i)(A)

Training - Affected Employee

- Training shall include:
  - Purpose and use of the energy control procedure

1910.147(c)(7)(i)(B)

Training - Other Employees

- All other employees whose work operations are, or may be, in an area where energy control procedures may be utilized, shall be instructed about:
  - the procedure, and
  - the prohibition related to restarting or reenergizing machines that are locked or tagged out

1910.147(c)(7)(i)(C)

Additional Training - Tagout System

- Employees shall be trained in the limitations of tags, as follows:
  - Warning devices only
  - Must not be removed/bypassed/ignored
  - Must be legible and understandable
  - Must withstand environmental conditions
  - May evoke false sense of security
  - Must be securely attached

1910.147(c)(7)(i)

Employee Retraining

- Shall be provided for all authorized and affected employees when:
  - Change in job assignments
  - Change in machines, equipment or processes that present new hazards
  - Change in energy control procedures
  - Periodic inspection reveals, or employer has reason to believe, there are deviations in employee knowledge of procedures

1910.147(c)(7)(iii)

Application of Energy Control

- Lockout/Tagout procedures shall cover the following elements in the following sequence:
  - Preparation for shutdown
  - Machine/equipment shutdown
  - Machine/equipment isolation
  - Lockout/tagout device application
  - Release of stored energy
  - Verification of isolation

1910.147(d)(1)-(6)

Release from Lockout/Tagout

- Prior to restoring energy, the following procedures are required
  - ☐ Inspect machine and equipment
  - ☐ Safe positioning and notification of employees
  - ☐ Removal of lockout/tagout device

1910.147(e)(1)-(3)

Testing of Machines

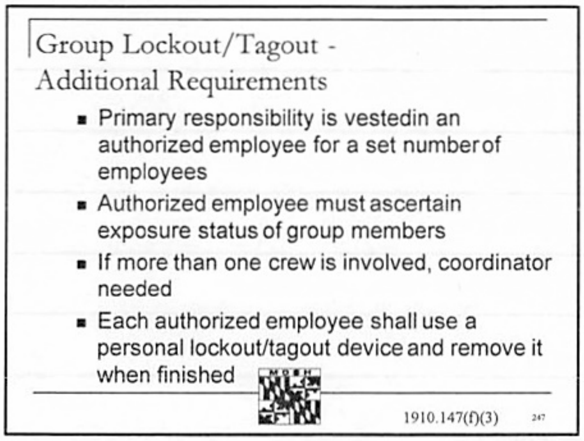
- When lockout/tagout devices must temporarily be removed for testing/positioning:
  - ☐ Clear machine of tools
  - ☐ Remove employees
  - ☐ Remove lockout/tagout device
  - ☐ Energize and test
  - ☐ De-energize and reapply energy control measures

1910.147(f)(1)

Outside Personnel (Contractors)

- On-site employer and outside employer shall inform each other of their respective procedures
- On-site employer shall ensure that his/her employees understand and comply with contractor's procedures

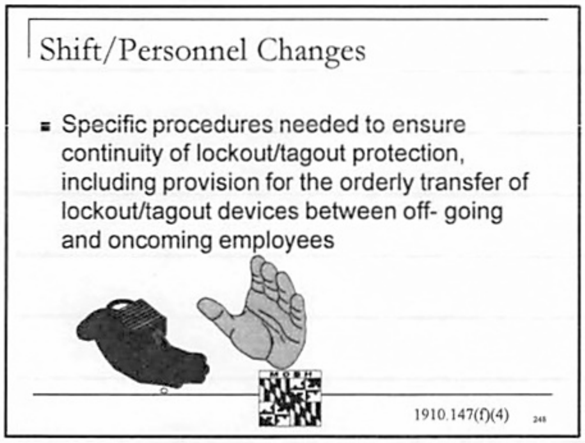
1910.147(f)(2)



Group Lockout/Tagout - Additional Requirements

- Primary responsibility is vestedin an authorized employee for a set numberof employees
- Authorized employee must ascertain exposure status of group members
- If more than one crew is involved, coordinator needed
- Each authorized employee shall use a personal lockout/tagout device and remove it when finished

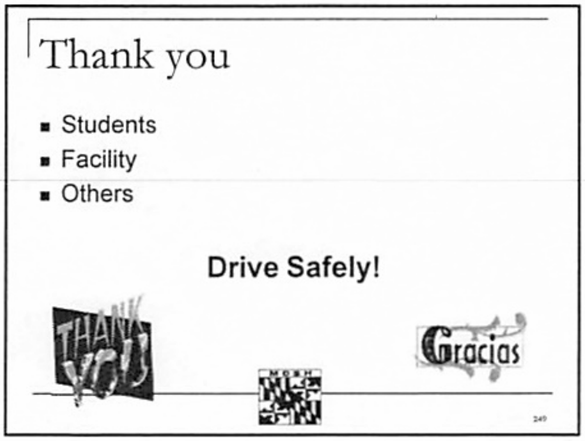
1910.147(f)(3)



Shift/Personnel Changes

- Specific procedures needed to ensure continuity of lockout/tagout protection, including provision for the orderly transfer of lockout/tagout devices between off- going and oncoming employees

1910.147(f)(4)

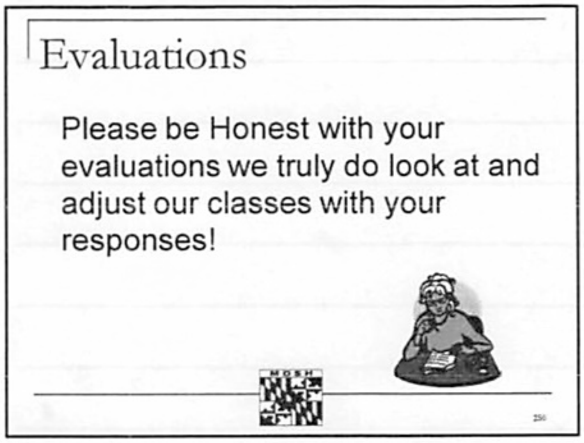


Thank you

- Students
- Facility
- Others

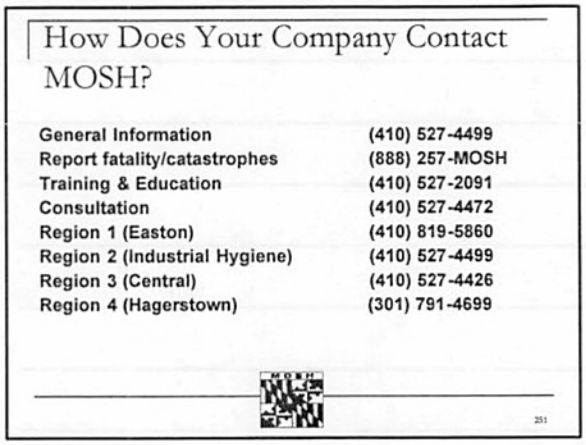
Drive Safely!

THANK YOU
Gracias



Evaluations

Please be Honest with your evaluations we truly do look at and adjust our classes with your responses!



How Does Your Company Contact MOSH?

General Information	**(410) 527-4499**
Report fatality/catastrophes	**(888) 257-MOSH**
Training & Education	**(410) 527-2091**
Consultation	**(410) 527-4472**
Region 1 (Easton)	**(410) 819-5860**
Region 2 (Industrial Hygiene)	**(410) 527-4499**
Region 3 (Central)	**(410) 527-4426**
Region 4 (Hagerstown)	**(301) 791-4699**